IP Keyswitch

Feature History

Release	Modification
12.1(5)YD	This feature was introduced on the Cisco 2600 series and Cisco 3600 series multiservice routers, and Cisco IAD2420 routers.

This feature module describes the IP Keyswitch feature, under the IP Telephony services umbrella based on Cisco IOS software, introduced in Cisco IOS Release 12.1(5)YD on the Cisco 2600 series and Cisco 3600 series multiservice routers, and Cisco IAD2420 routers.

This document includes the following sections:

Feature Overview

The IP Keyswitch feature, under the IP Telephony services umbrella, provides basic Cisco IP phone call-handling capabilities in a LAN environment on the Cisco routers. This feature enables the Cisco routers to act as the IP Keyswitch for the Cisco IP Phone 7960, Cisco IP Phone 7940, and Cisco IP Phone 7910 and helps load phone images, configures, and manages the Cisco IP phones in your LAN. It also provides call forwarding and call transfer to other phone numbers or devices such as a message system. The IP Keyswitch feature provides you with a keyswitch for a small office with a small number of extensions, where you do not require a Cisco CallManager for call-handling.

The following features are supported on the Cisco IP phones:

- Function keys
- Dial-plan class of restriction (COR)
- Call hold and retrieve

- Call pickup of on-hold calls
- Multiple lines per Cisco IP phone
- Multiple line appearance across telephones
- Call forwarding functions: all, busy, and no answer
- Call transferring
- Speed-dialing
- Cisco IP phones derive the date and time from the router through Network Time Protocol (NTP)
- Interworking with Cisco Gatekeeper
- Distinctive ringing: external ringing versus internal ringing
- Caller identification display and blocking
- Analog Foreign Exchange Station (FXS) and Foreign Exchange Office (FXO) ports
- On-net calls using VoIP H.323, VoFR, and VoATM
- Supports 1 to 48 telephones depending on the platforms.
  - Maximum 24 Cisco IP phones for the Cisco 2600 series, Cisco 3620, and the Cisco IAD2420 routers
  - Maximum 48 Cisco IP phones for the Cisco 3640 and Cisco 3660 routers
- Supports 1 to 96 directory numbers (DN) depending on the platforms
  - Maximum 48 directory numbers or virtual voice ports for the Cisco 2600 series, Cisco 3620, and Cisco IAD2420 routers
  - Maximum 96 directory numbers or virtual voice ports for the Cisco 3640 multiservice routers

Cisco IP Phone

The IP Keyswitch feature supports the Cisco IP Phone 7960, Cisco IP Phone 7940, and Cisco IP Phone 7910 models.

Phone Image Loading

The Cisco multiservice routers provide support for the updating and storing of a new Cisco IP phone image. The IP Keyswitch router also provides the TFTP support for loading the images to the phone.

Phone Configuration

In the IP Keyswitch configuration, the Cisco IP phones receive initial configuration information and their firmware loads from the TFTP server. In most cases, the Cisco IP phones obtain the IP address of their TFTP server with the DHCP option 150. For IP Keyswitch operation, the TFTP server address obtained by the Cisco IP phones must point at the IP Keyswitch router. The Cisco IP phones attempt to TFTP a configuration file called SEPDEFAULT.cnf. This file is automatically generated by the IP Keyswitch router and placed in the router's Flash memory. The SEPDEFAULT.cnf file itself contains the IP address that the phones use to register for service, using the Skinny Client Control Protocol. This address should correspond to a valid Keyswitch router address (and may be the same as the router TFTP server address). Access to the SEPDEFAULT.cnf file must be granted through the **tftp-server** command on the router.

Provisioning

The router provides a mechanism to provision IP Keyswitch. This provisioning interface allows you to perform the following functions:

- Assign directory numbers to the line appearances on each Cisco IP phone
- Assign numbers to the speed-dial buttons on each Cisco IP phone
- Assign caller identification information to each directory number
- Assign directory numbers to phones other than Cisco IP phones attached to the system by using the standard voice-port and dial-peer configuration command line interface (CLI)
- Provide dial-plan information to route calls either to PSTN lines or voice network connections

Hot Plug Cisco IP Phones

The Cisco IP phones can be hot plugged and unplugged to the Cisco multiservice router without requiring a router reboot or manual status reset.

Figure 1 shows a branch office with several Cisco IP phones connected to either a Cisco 2600 series or a Cisco 3600 series multiservice router with the IP Keyswitch feature. The multiservice router is connected to the PSTN. There are possibilities to connect to a gatekeeper, a RADIUS billing server, or to a Cisco Voice Manager server in the future.

Figure 1 IP Keyswitch for the Branch Office

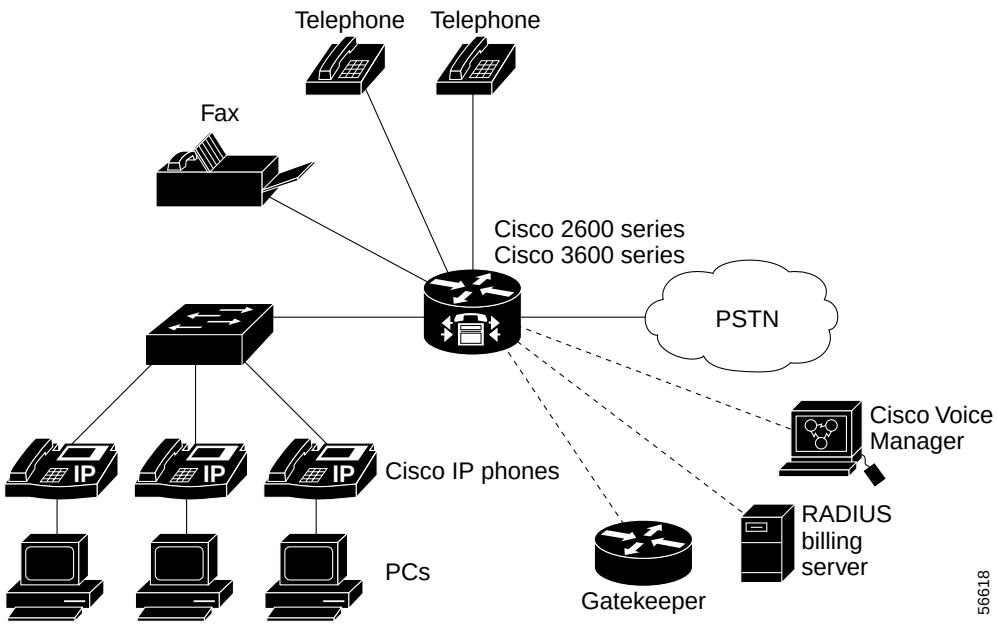
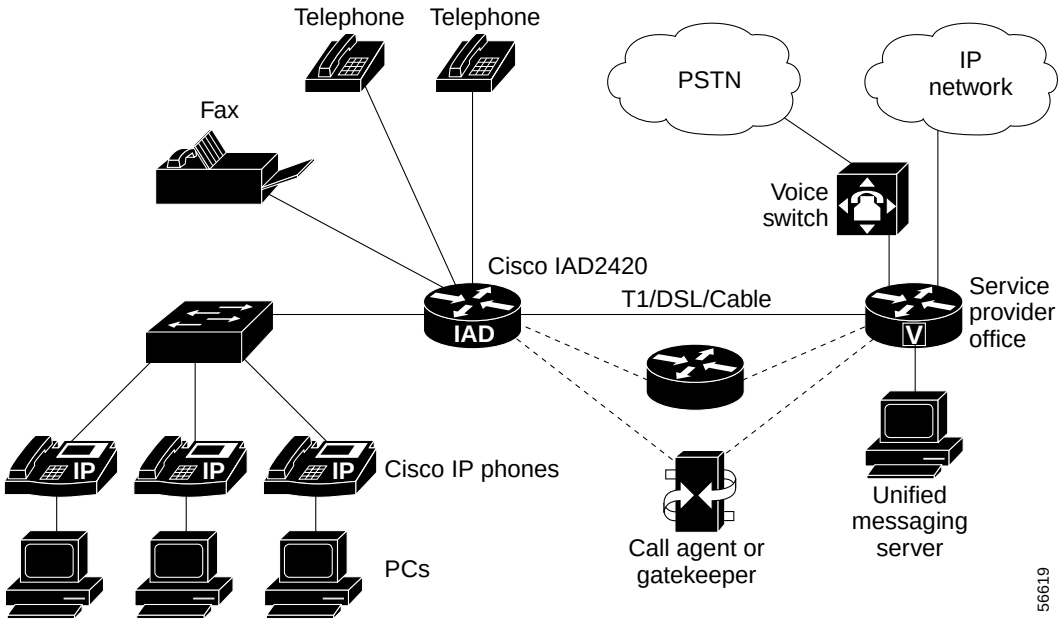


Figure 2 shows a branch office with several Cisco IP phones connected to a Cisco IAD2420 router with the IP Keyswitch feature. The Cisco IAD2420 router is connected to a multiservice router at a service provider office. The multiservice router at the service provider office provides connection to the WAN and PSTN.

Figure 2 IP Keyswitch for the Service Providers



Benefits

- Integrated voice, data, and telephony on a single platform
- Managed and maintained remotely
- Scalability by adding new Cisco IOS software upgrades on the deployed routers
- Leverage existing Cisco IOS features: Caller ID, ANI, DID, DOD, gatekeeper, and RADIUS billing server support
- Interoperability with VoIP H.323, VoFR, and VoATM
- Multiple lines per Cisco IP phone
- Shared line appearance across several phones

Restrictions

- SIP and MGCP on-net calls are not supported.
- Only supports the Cisco IP Phone 7960, Cisco IP Phone 7940, and Cisco IP Phone 7910 models.

Note First generation Cisco IP phones, such as Cisco IP Phone 30 VIP and Cisco IP Phone 12 SP+ are not supported.

- Supports 1 to 48 telephones depending on the platforms.
  - Maximum 24 Cisco IP phones for the Cisco 2600 series, Cisco 3620, and the Cisco IAD2420 routers
  - Maximum 48 Cisco IP phones for the Cisco 3640 and Cisco 3660 routers
- Supports 1 to 96 directory numbers (DN) depending on the platforms
  - Maximum 48 directory numbers or virtual voice ports for the Cisco 2600 series, Cisco 3620, and Cisco IAD2420 routers
  - Maximum 96 directory numbers or virtual voice ports for the Cisco 3640 multiservice routers

Related Features and Technologies

- Survivable Remote Site Telephony

Note The Survivable Remote Site (SRS) Telephony feature and the IP Keyswitch feature are mutually exclusive. These two features cannot be provisioned simultaneously on the same router.

Related Documents

- *Cisco IOS Multiservice Applications Configuration Guide*
- *Cisco IOS Multiservice Applications Command Reference*
- *Cisco IOS Debug Command Reference*
- *Cisco IOS DHCP Server*
- *Getting Started with the Cisco IP Phone 7910*
- *Getting Started with the Cisco IP Phone 7960/7940*
- *Quick Reference Cisco IP Phone 7910 for IP Keyswitch*
- *Quick Reference Cisco IP Phone 7960/7940 for IP Keyswitch*

Supported Platforms

- Cisco 2600 series
- Cisco 3600 series
- Cisco IAD2420 router

Supported Standards, MIBs, and RFCs

Standards

No new or modified standards are supported by this feature.

MIBs

No new or modified MIBs are supported by this feature.

To obtain lists of supported MIBs by platform and Cisco IOS release, and to download MIB modules, go to the Cisco MIB web site on Cisco.com at http://www.cisco.com/public/sw-center/netmgmt/cmtk/mibs.shtml.

RFCs

No new or modified RFCs are supported by this feature.

Prerequisites

- IP Routing enabled.
- Network is configured with Dynamic Host Configuration Protocol (DHCP).
- Cisco IOS Release 12.1(5)YD or higher.
- Appropriate Cisco IP phone load versions that support the Cisco IP Phone 7960, Cisco IP Phone 7940, and Cisco IP Phone 7910 models: P003D302, P004D302, or higher. To get the appropriate Cisco IP phone load versions, go to the following URL: http://www.cisco.com/cgi-bin/tablebuild.pl/ip-key.

Note You need to purchase a feature license to turn this new feature on. You also need an account on Cisco.com to access the Cisco IP phone load versions.

Configuration Tasks

See the following sections for configuration tasks for the IP Keyswitch feature. Each task in the list indicates if the task is optional or required.

- Configuring DHCP for the Cisco IP Phone (required), page 6
- Configuring IP Keyswitch (required), page 9
- Accessing Phone Firmware on the TFTP Server (required), page 11
- Configuring Cisco IP Phones (required), page 11
- Creating Directory Numbers for the Cisco IP Phones (required), page 12
- Verifying IP Keyswitch, page 13
- Troubleshooting Tips, page 14

Configuring DHCP for the Cisco IP Phone (required)

When the Cisco IP phone is turned on, it automatically queries for a DHCP server. Then the DHCP server responds by assigning an IP address to the Cisco IP phone. The IP address of the Trivial File Transfer Protocol (TFTP) server is also provided through DHCP option 150. The Cisco IP phone then attempts to get the configuration file SEPDEFAULT.cnf and phone load from the TFTP server.

Note The SEPDEFAULT.cnf file is autogenerated in the router's Flash memory when the IP Keyswitch feature is configured.

You can configure DHCP for the Cisco IP phones by performing any of the following tasks:

- Configuring DHCP IP Address Pool
- Configuring DHCP IP Address for Each Cisco IP Phone
- Configuring DHCP Relay

Configuring DHCP IP Address Pool

Note This process creates a large shared pool of IP addresses, where all DHCP clients receive the same information, including the option 150 TFTP server IP address. This can be a problem if some (non-IP phone) clients need to use a different TFTP server address.

To globally configure DHCP for all the Cisco IP phones and other devices attached to the IP Keyswitch router, enter the following commands beginning in global configuration mode:

	Command	Purpose
Step 1	`Router(config)# ip dhcp pool pool 1`	Creates a name for the DHCP server address pool and enters DHCP pool configuration mode.
Step 2	`Router(config-dhcp) network ip-address`	Specifies the IP address of the network.

Step 3	`Router(config-dhcp)# option 150 ip ip-address`
	`Or`
	`Router(config-dhcp)# next-server ip-address`
	`Or`
	`Router(config-dhcp)# option 66 ip ip-address`
		The **option 150** command specifies the TFTP server address from which the Cisco IP phone downloads the image configuration file, SEPDEFAULT.cnf. This is your IP Keyswitch router address.
		The **next-server** command specifies the IP address of the TFTP server to be used by the DHCP client.
		Note Any of the three command steps can be used to specify the TFTP server address.

Step 4	`Router(config-dhcp)# default-router ip-address`	The Cisco IP phones are directly connected to this router. This router is either a Cisco IP Keyswitch router or any Cisco router attached to the IP Keyswitch router. **Note** As long as the Cisco IP phones have connection to the IP Keyswitch router, the Cisco IP phones are able to get the required network details.

Configuring DHCP IP Address for Each Cisco IP Phone

To configure DHCP for each Cisco IP phone connected to the IP Keyswitch router, perform the following tasks beginning in global configuration mode:

	Command	Purpose
Step 1	`Router(config)# ip dhcp pool phone 1`	Creates a name for the DHCP server address pool and enters DHCP pool configuration mode.
Step 2	`Router(config-dhcp)# host ip-address`	Specifies the IP address you want the phone to get.
Step 3	`Router(config-dhcp)# client-identifier mac address`	Specifies the MAC address of the phone. The MAC address is printed on a sticker and placed under each Cisco IP phone. **Note** Here you must use a 01 prefix number before the MAC address.

Step 4	`Router(config-dhcp)# option 150 ip ip-address`
	`Or`
	`Router(config-dhcp)# next-server ip-address`
	`Or`
	`Router(config-dhcp)# option 66 ip ip-address`
		The **option 150** command specifies the TFTP server address from which the Cisco IP phone downloads the image configuration file, SEPDEFAULT.cnf. This is your IP Keyswitch router address.
		The **next-server** command specifies the IP address of the TFTP server to be used by the DHCP client.
		Note Any of the three command steps can be used to specify the TFTP server address.

Step 5	`Router(config-dhcp)# default-router ip-address`	The Cisco IP phones are directly connected to this router. This router is either a Cisco IP Keyswitch router or any Cisco router attached to the IP Keyswitch router. **Note** As long as the Cisco IP phones have connection to the IP Keyswitch router, the Cisco IP phones are able to get the required network details.

Configuring DHCP Relay

To configure DHCP relay on the LAN interface where the Cisco IP phones are homed, perform the following tasks beginning in global configuration mode:

:

	Command	Purpose
Step 1	`Router(config)# interface type number`	Enters interface configuration mode for the specified interface.

	Command	Purpose
Step 2	`Router(config-if)# ip helper-address ip-address`	Specifies the destination address for TFTP server and DNS server requests. For each server, a separate **ip helper-address** command is required if they are on different hosts. You can also configure multiple TFTP server targets by using the **ip helper-address** commands for multiple servers.
Step 3	`Router(config)# ip dhcp relay`	Updates DHCP relay agent parameters. To change the DHCP relay options, refer to the *Cisco IOS DHCP Server* document.

Configuring IP Keyswitch (required)

To configure IP Keyswitch, complete the following tasks beginning in global configuration mode:

	Command	Purpose
Step 1	`Router(config)# keyswitch`	Enters keyswitch configuration mode.
Step 2	`Router(config-keyswitch)# ip source-address ip-address [port port] [any-match | strict-match]`	Identifies the IP address and port number the keyswitch router uses for the IP phone service. The default port is 2000. The **ip source-address** command helps the router to autogenerate the SEPDEFAULT.cnf file, which is stored in the router Flash memory. The SEPDEFAULT.cnf file contains the IP address of one of the Ethernet ports of the router to which the phone should register. This file is specific to the router and cannot be shared by multiple routers. Use the **any-match** keyword to instruct the router to permit Cisco IP phone registration and use the **strict-match** keyword to instruct the router to reject Cisco IP phone registration attempts if the IP server address used by the phone does not exactly match the source-address.
Step 3	`Router(config-keyswitch)# load {7960-7940 | 7910} phone firmware`	Identifies the Cisco IP phone firmware image that you want the Cisco IP phone to use. You must enter this command for each type of phone. The Cisco IP Phone 7960 and Cisco IP Phone 7940 have the same phone load. **Note** When you enter the **load** command, you do not use the extension of the file; for example, .bin.

	Command	Purpose
Step 4	`Router(config-keyswitch)# max-ephones max phones`	Configures the maximum number of Cisco IP phones supported by the IP Keyswitch router. The default is 0. The upper limit value is platform dependent: • Maximum 24 Cisco IP phones for the Cisco 2600 series, Cisco 3620, and Cisco IAD2420 routers • Maximum 48 Cisco IP phones for the Cisco 3640 and Cisco 3660 multiservice routers **Note** You cannot reduce the limit of the Cisco IP phones after the maximum allowable number is configured, without rebooting the router.
Step 5	`Router(config-keyswitch)# max-dn max directory number`	Configures maximum number of directory numbers supported by the IP Keyswitch router. The default is 0. The upper limit value is platform dependent: • Maximum 48 directory numbers for the Cisco 2600 series, Cisco 3620, and Cisco IAD2420 routers • Maximum 96 directory numbers for the Cisco 3640 and Cisco 3660 multiservice routers **Note** You cannot reduce the limit of the directory numbers after the maximum allowable number is configured, without rebooting the router.
Step 6	`Router(config-keyswitch)# dialplan-pattern tag pattern extension-length number`	Creates a global prefix that can be used to expand the abbreviated extension numbers into fully qualified E.164 numbers. The **extension-length** keyword enables the system to convert a full E.164 telephone number back to an extension number for the purposes of caller-ID display, received, and missed call lists.
Step 7	`Router(config-keyswitch)# keepalive seconds`	(Optional) Configures the time interval between sending keepalive messages to the router used by the Cisco IP phones. The default is 30 seconds.
Step 8	`Router(config-keyswitch)# reset {all | mac-address mac-address}`	(Optional) Resets the Cisco IP phone. Use the **all** keyword to reset all the Cisco IP phones, and use the **mac-address** keyword to reset a specific Cisco IP phone.

	Command	Purpose
Step 9	`Router(config-keyswitch)# transfer-pattern transfer-pattern`	(Optional) Allows transfer of telephone calls to other non-IP phone numbers.
Step 10	`Router(config-keyswitch)# voicemail phone-number`	(Optional) Configures the telephone number that is speed-dialed when the message button on a Cisco IP phone is pressed.

Accessing Phone Firmware on the TFTP Server (required)

When the Cisco IP phone contacts the TFTP server, it requests a configuration (SEPDEFAULT.cnf) file. The SEPDEFAULT.cnf file contains the IP address of the IP Keyswitch server.

Tips Make sure that the Flash memory contains the SEPDEFAULT.cnf file and the phone load firmware images before enabling access to the phone firmware.

To enable access to the configuration file and phone firmware on the TFTP server, perform the following tasks in global configuration mode:

	Command	Purpose
Step 1	`Router(config)# tftp-server flash:SEPDEFAULT.cnf`	Enables TFTP access to SEDEFAULT.cnf file on the TFTP server so that the phone can get the file. **Note** The file name is case-sensitive, for example, .cnf file and .bin files.
Step 2	`Router(config)# tftp-server flash:phone firmware`	Specifies the phone firmware image on the TFTP server that the Cisco IP phone can download. If you are using the Cisco IP Phone 7960, the Cisco IP Phone 7940, and the Cisco IP Phone 7910, enter the **tftp-server flash** command and specify the phone firmware image to download the images for both the Cisco IP phones. **Note** You must manually copy the phone firmware image files to the Flash memory of the IP Keyswitch router.

Configuring Cisco IP Phones (required)

Note Each Cisco IP phone must be configured individually on the IP Keyswitch router to receive support in the LAN environment. You configure each physical Cisco IP phone by entering the **ephone** command, then you must assign a number to the phone lines by entering the **ephone-dn** command.

To create Cisco IP phone entries on the IP Keyswitch router, perform the following tasks beginning in global configuration mode:

	Command	Purpose
Step 1	`Router(config)# ephone tag`	Enters the Ethernet phone configuration mode and creates Cisco IP phone entries. The Cisco IP phone limit is platform dependent: • Maximum 24 Cisco IP phones for the Cisco 2600 series, Cisco 3620, and Cisco IAD2420 routers • Maximum 48 Cisco IP phones for the Cisco 3640 and Cisco 3660 multiservice routers
Step 2	`Router(config-ephone)# mac-address mac-address`	Creates the MAC address of the registering phone.
Step 3	`Router(config-ephone)# button button-number:dn-tag button-number:dn-tag`	Assigns a button number to the Cisco IP phone directory number. The argument *button-number:dn-tag*, for example, can use the values 1:1, 2:4, or 3:14. In this example, button 1 corresponds to directory number 1 (ephone-dn 1), button 2 corresponds to directory number 4, and button 3 corresponds to directory number 14. The buttons correspond to the phone lines on the Cisco IP phone.
Step 4	`Router(config-ephone)# speed-dial button-number directory-number`	(Optional) Sets speed-dial buttons on a Cisco IP phone.
Step 5	`Router(config-ephone)# reset`	(Optional) Resets the Cisco IP phones.

Creating Directory Numbers for the Cisco IP Phones (required)

To create directory numbers for the Cisco IP phones, perform the following tasks beginning in global configuration mode:

	Command	Purpose
Step 1	`Router(config)# ephone-dn dn-tag`	Configures the directory numbers for the Cisco IP phone lines and enters ephone-dn configuration mode. The directory number is platform dependent: • Maximum 48 for the Cisco 2600 series, Cisco 3620, and Cisco IAD2420 routers • Maximum 96 for the Cisco 3640 and Cisco 3660 multiservice routers
Step 2	`Router(config-ephone-dn)# number number [secondary number]`	Configures a valid number for the Cisco IP phone. The **secondary** keyword allows you to associate a second telephone number with an ephone-dn so that the IP phone line can be called by dialing either the main or the secondary phone number.

	Command	Purpose
Step 3	`Router(config-ephone-dn)# name name`	Configures a user name associated with a directory number.
Step 4	`Router(config-ephone-dn)# preference preference order`	(Optional) Sets preference for the attached dial peer for a directory number. The default is 0.
Step 5	`Router(config-ephone-dn)# cor {incoming | outgoing} cor-list-name`	(Optional) Configures a class of restriction (COR) on the dial peers associated with a directory number. COR is used to specify which incoming dial peer can use which outgoing dial peer to make a call. Each dial peer can be provisioned with an incoming and an outgoing COR list.
Step 6	`Router(config-ephone-dn)# call-forward all directory-number`	(Optional) Configures call-forwarding for all the incoming calls on one of the lines of a Cisco IP phone to another telephone.
Step 7	`Router(config-ephone-dn)# call-forward busy directory-number`	(Optional) Configures call-forwarding to another number when the Cisco IP phone is busy.
Step 8	`Router(config-ephone-dn)# call-forward noan directory-number`	(Optional) Configures call-forwarding to another number when no answer is received from the Cisco IP phone.
Step 9	`Router(config-ephone-dn)# caller-id`	(Optional) Configures caller-ID display and blocking for a Cisco IP phone. By default, caller ID is not blocked on calls originating from the Cisco IP phone.

Disabling and Reenabling Huntstop

Note In the ephone-dn configuration mode huntstop is set by default.

To disable huntstop or to reenable huntstop, use the following command in ephone-dn configuration mode:

	Command	Purpose
Step 1	`Router(config-ephone-dn)# no huntstop`	Disables huntstop.
Step 1	`Router(config-ephone-dn)# huntstop`	Enables huntstop.

Verifying IP Keyswitch

To verify that the IP Keyswitch feature is enabled, follow these steps:

Step 1 Enter the **show run** command to verify the configuration.

Step 2 Enter the **show keyswitch all** command to verify that IP Keyswitch is enabled.

Step 3 Verify that DHCP is configured.

Step 4 Verify that TFTP is configured.

Step 5 Enter the **dir** command to verify that the SEPDEFAULT.cnf file and the phone load image files are stored in the router Flash memory.

Step 6 Enter the **show ephone** [*mac-address*] command to verify all the Cisco IP phones in the network.

Troubleshooting Tips

To troubleshoot the IP Keyswitch feature, perform the following steps:

Step 1 Enter the **show ephone** command to display all registered phones. If no phones are registered, then perform the following:

- **a.** Configure the IP Keyswitch router.
- **b.** Check DHCP configuration, including default router and the TFTP server address (Option 150).
- **c.** Check that the required files are in the router Flash memory. The **dir** command displays the files in the Flash memory.
- **d.** Check that the **tftp-server** command is set for the required files.
- **e.** Use the **debug ephone register** *mac-address* command to display the Cisco IP phone registration activity.
- **f.** Use the **debug ip dhcp** command to confirm DHCP operation.

Step 2 Enter the **show ephone** command to display all registered phones. If phones are registered and are displayed, then perform the following:

- **a.** Check that the phone button binding to the directory number is correct.
- **b.** Check that the Cisco IP phones show as registered.
- **c.** Verify the IP parameter settings on the Cisco IP phone, using the Settings display on the phone.
- **d.** Check that the keepalive count is being updated when you enter the **show ephone** command.
- **e.** Reset the phone and observe the re-registration by entering the **debug ephone register** *mac-address* command to display the Cisco IP phones.
- **f.** Enter the **show ephone-dn summary** command to check the state of the Cisco IP phone lines.
- **g.** Check the IP address of the phone and attempt to ping the address.

Step 3 Use the **debug ephone keepalive** command to set keepalive debugging for the Cisco IP phones.

Step 4 Use the **debug ephone state** command to set state debugging for the Cisco IP phones.

To troubleshoot other areas of the IP Keyswitch feature, use the following commands:

- Use the **debug ephone detail** command to set detail debugging for the Cisco IP phone.
- Use the **debug ephone error** command to set error debugging for the Cisco IP phone.
- Use the **debug ephone statistics** command to set call statistics debugging for the Cisco IP phone.
- Use the **debug ephone pak** command to provide voice packet level debugging and print the contents of one voice packet in every 1024 voice packets.
- Use the **debug ephone raw** command to provide raw low-level protocol debugging display for all Skinny Client Control Protocol messages.

For further debugging, you can use the debug commands in the *Cisco IOS Debug Command Reference*.

Monitoring and Maintaining IP Keyswitch

To monitor and maintain the IP Keyswitch feature, enter the following commands:

Command	Purpose
Router# **show run**	Displays the configuration.
Router# **show keyswitch all**	Displays the detailed configuration of all the Cisco IP phones, voice ports, and dial peers of the IP Keyswitch router.
Router# **show keyswitch dial-peer**	Displays the output of the dial peers of the IP Keyswitch router.
Router# **show keyswitch ephone-dn**	Displays Cisco IP phone destination number of the IP Keyswitch router.
Router# **show keyswitch voice-port**	Displays output for the voice ports of the IP Keyswitch router.
Router# **show ephone** [*mac-address*]	Displays Cisco IP phone output.
Router# **show ephone-dn summary**	Displays a summary of all Cisco IP phone destination numbers.
Router# **show ephone summary**	Displays a summary of all Cisco IP phones.
Router# **show voice port summary**	Displays a summary of all voice ports.
Router# **show dial-peer voice summary**	Displays a summary of all voice dial peers.

Configuration Examples

This section provides the following configuration example for the IP Keyswitch feature:

```
!
version 12.1
no service single-slot-reload-enable
service timestamps debug uptime
service timestamps log uptime
no service password-encryption
!
hostname Snoopy
!
no logging buffered
logging rate-limit console 10 except errors
!
!
!
clock timezone GMT -23
ip subnet-zero
!
!
no ip finger
no ip domain-lookup
```

```
!
ip dhcp pool PHONE1
   host 10.1.0.2 255.255.0.0
   client-identifier 0100.3094.c337.cb
   option 150 ip 172.198.0.2
   default-router 10.1.0.1
!
ip dhcp pool PHONE2
   host 10.1.0.3 255.255.0.0
   client-identifier 0100.3094.c3f9.6a
   default-router 10.1.0.1
   option 150 ip 172.198.0.2
!
!
!
!
!
!
!
!
!
!
interface FastEthernet0/1
 ip address 10.1.0.1 255.255.0.0
 duplex auto
 speed auto
!
ip kerberos source-interface any
ip classless
no ip http server
!
!
!
!
snmp-server packetsize 4096
snmp-server manager
tftp-server flash:SEPDEFAULT.cnf
tftp-server flash:P004D302.bin
tftp-server flash:P003D302.bin
call rsvp-sync
!
voice-port 1/0/0
!
voice-port 1/0/1
!
mgcp modem passthrough voip mode ca
no mgcp timer receive-rtcp
!
mgcp profile default
!
dial-peer cor custom
!
!
!
!
keyswitch
 transfer-pattern 510734....
 load 7910 P004D302
 load 7960-7940 P003D302
 ip source-address 10.1.0.1 port 2000
 max-ephones 24
 max-dn 24
 dialplan-pattern 1 408734.... extension-length 4
 voicemail 11111
```

```
!
!
ephone-dn  1
 number 5001
!
!
ephone-dn  2
 number 5002
 call-forward noan 5001 timeout 8
!
!
ephone-dn  3
 number 5003
!
!
ephone-dn  4
 number 5004
!
!
ephone  1
 mac-address 0030.94C3.37CB
 speed-dial 1 5002
 speed-dial 2 5003
 button  1:1
!
!
!
ephone  2
 mac-address 0030.94C3.F96A
 speed-dial 1 5004
 speed-dial 2 5001
 button  1:2 2:3 3:4
!
!
!
line con 0
 exec-timeout 0 0
 transport input none
line aux 0
line vty 0 4
 login
!
no scheduler allocate
end
```

Command Reference

This section documents new commands. All other commands used with the IP Keyswitch feature are documented in the Cisco IOS Release 12.1 command reference publications.

- **button (ephone)**
- **call-forward all (ephone-dn)**
- **call-forward busy (ephone-dn)**
- **call-forward noan (ephone-dn)**
- **caller-id (ephone-dn)**
- **cor (ephone-dn)**
- **debug ephone detail**
- **debug ephone error**
- **debug ephone keepalive**
- **debug ephone pak**
- **debug ephone raw**
- **debug ephone register**
- **debug ephone state**
- **debug ephone statistics**
- **dialplan-pattern (keyswitch)**
- **ephone**
- **ephone-dn**
- **huntstop (ephone-dn)**
- **ip source-address (keyswitch)**
- **keepalive (keyswitch)**
- **keyswitch**
- **load (keyswitch)**
- **mac-address (ephone)**
- **max-dn (keyswitch)**
- **max-ephones (keyswitch)**
- **name (ephone-dn)**
- **number (ephone-dn)**
- **preference (ephone-dn)**
- **reset (ephone)**
- **reset (keyswitch)**
- **show ephone**
- **show ephone-dn**
- **show ephone summary**
- **show keyswitch all**

- **show keyswitch dial-peer**
- **show keyswitch ephone**
- **show keyswitch ephone-dn**
- **show keyswitch voice-port**
- **speed-dial (ephone)**
- **transfer-pattern (keyswitch)**
- **voicemail (keyswitch)**

button (ephone)

To assigns a button number to the Cisco IP phone directory number, use the **button** ephone configuration command. To disable associated directory numbers with line appearance buttons on a phone, use the **no** form of this command.

button *button-number:dn-tag button-number:dn-tag*

no button *button-number:dn-tag*

Syntax Description

button-number	Button numbers on the Cisco IP phone. The buttons are from 1 to 6 for the Cisco IP Phone 7960; Cisco IP Phone 7940 supports 2 line buttons; and only button 1 is valid on the Cisco IP Phone 7910. **Note** If the assigned button configurations supported by the physical phone are less than the configured buttons, the additional button configurations are ignored.
dn-tag	Previously defined directory number tag.

Defaults

No default behavior or values.

Command Modes

Ephone configuration

Command History

Release	Modification
12.1(5)YD	This command was introduced on the Cisco 2600 series and Cisco 3600 series multiservice routers, and Cisco IAD2420 routers.

Usage Guidelines

The **button** command assigns telephone lines to the Cisco IP phones.

Examples

The following example shows how to assign a button number on the phone to directory number tags:

```
Router(config)# ephone 1
Router(config-ephone)# button 1:1 2:4 3:16 4:19
```

Related Commands

Command	Description
ephone	Enters ephone configuration mode.
ephone-dn	Enters the ephone-dn configuration mode.
keyswitch	Enables IP Keyswitch support and enters keyswitch configuration mode.
show ephone	Displays Cisco IP phone output.

call-forward all (ephone-dn)

To configure call-forwarding for all the incoming calls on one of the lines of a Cisco IP phone to another telephone, use the **call-forward all** ephone-dn configuration command. To disable call-forwarding, use the **no** form of this command.

call-forward all *directory-number*

no call-forward all [*directory-number*]

Syntax Description

directory-number	Selected directory number.

Defaults

No default behavior or values.

Command Modes

Ephone-dn configuration

Command History

Release	Modification
12.1(5)YD	This command was introduced on the Cisco 2600 series and Cisco 3600 series multiservice routers, and Cisco IAD2420 routers.

Usage Guidelines

The call forwarding mechanism is applied to the individual telephone line (directory number) and cannot be configured on a per Cisco IP phone basis.

Note The **call-forward all** command takes precedence over the **call-forward busy** and **call-forward noan** commands.

Examples

The following example shows how to set call forwarding of all calls on line 1, directory number 5001, to directory number 5005. All incoming calls destined for extension 5001 are forwarded to another Cisco IP phone with the extension number 5005:

```
Router(config)# ephone-dn 1
Router(config-ephone-dn)# call-forward all 5001
```

Related Commands

Command	Description
call-forward busy	Configures call-forwarding to another number when the Cisco IP phone is busy.
call-forward noan	Configures call-forwarding to another number when no answer is received from the Cisco IP phone.

Command	Description
ephone	Enters ephone configuration mode.
ephone-dn	Enters the ephone-dn configuration mode.

call-forward busy (ephone-dn)

To configure call-forwarding to another number when the Cisco IP phone is busy, use the **call-forward busy** ephone-dn configuration command. To disable call-forwarding, use the **no** form of this command.

call-forward busy *directory-number*

no call-forward busy [*directory-number*]

Syntax Description

directory-number	Selected directory number.

Defaults

No default behavior or values.

Command Modes

Ephone-dn configuration

Command History

Release	Modification
12.1(5)YD	This command was introduced on the Cisco 2600 series and Cisco 3600 series multiservice routers, and Cisco IAD2420 routers.

Usage Guidelines

The call forwarding mechanism is applied to the individual telephone line (directory number) and cannot be configured on a per Cisco IP phone basis.

Note The **call-forward all** command takes precedence over the **call-forward busy** and **call-forward noan** commands.

Examples

The following example shows how to set call forwarding of incoming calls to directory number 5005 when line 1, directory number 5001, is busy:

```
Router(config)# ephone-dn 1
Router(config-ephone-dn)# call-forward busy 5001
```

Related Commands

Command	Description
call-forward all	Configures call-forwarding for all the incoming calls on one of the lines of a Cisco IP phone to another telephone.
call-forward noan	Configures call-forwarding to another number when no answer is received from the Cisco IP phone.
ephone	Enters ephone configuration mode.
ephone-dn	Enters the ephone-dn configuration mode.

call-forward noan (ephone-dn)

To configure call-forwarding to another number when no answer is received from the Cisco IP phone, use the **call-forward noan** ephone-dn configuration command. To disable call-forwarding, use the **no** form of this command.

call-forward noan *directory-number* **timeout** *seconds*

no call-forward noan [*directory-number*]

Syntax Description

directory-number	Selected directory number.
timeout	Waiting time before the call is forwarded to another phone. The time is set in seconds.
seconds	Time set for the call forwarding to start.

Defaults

No default behavior or values.

Command Modes

Ephone-dn configuration

Command History

Release	Modification
12.1(5)YD	This command was introduced on the Cisco 2600 series and Cisco 3600 series multiservice routers, and Cisco IAD2420 routers.

Usage Guidelines

The call forwarding mechanism is applied to the individual telephone line (directory number) and cannot be configured on a per Cisco IP phone basis.

Note The **call-forward all** command takes precedence over the **call-forward busy** and **call-forward noan** commands.

Examples

The following example shows how to set call forwarding of incoming calls to directory number 5005 when line 1, directory number 5001, is not answering. The **timeout** before the call is forwarded to the directory number 5005 is set for 10 seconds:

```
Router(config)# ephone-dn 1
Router(config-ephone-dn)# call-forward noan 5001 timeout 10
```

Related Commands

Command	Description
call-forward all	Configures call-forwarding for all the incoming calls on one of the lines of a Cisco IP phone to another telephone.
call-forward busy	Configures call-forwarding to another number when the Cisco IP phone is busy.
ephone	Enters ephone configuration mode.
ephone-dn	Enters the ephone-dn configuration mode.

caller-id (ephone-dn)

To configure caller-ID display and blocking, use the **caller-id** ephone-dn configuration command. To disable caller ID, use the **no** form of this command.

caller-id *directory-number*

no caller-id *directory-number*

Syntax Description

directory-number	Selected directory number for caller-ID blocking.

Defaults

Caller ID is not blocked on calls originating from a Cisco IP phone.

Command Modes

Ephone-dn configuration

Command History

Release	Modification
12.1(5)YD	This command was introduced on the Cisco 2600 series and Cisco 3600 series multiservice routers, and Cisco IAD2420 routers.

Usage Guidelines

The **caller-id** command sets caller-ID display and blocking for a Cisco IP phone.

Examples

The following example shows how to set caller ID for the directory number 5001:

```
Router(config-ephone-dn)# caller-id
Router(config-ephone-dn)# number 5001
```

Related Commands

Command	Description
ephone	Enters ephone configuration mode.
ephone-dn	Enters the ephone-dn configuration mode.

cor (ephone-dn)

To configure a class of restriction (COR) on the dial peers associated with a directory number, use the **cor** ephone-dn configuration command. To disable COR associated with a directory number, use the **no** form of this command.

cor {**incoming** | **outgoing**} *cor-list-name*

no cor *cor-list-name*

Syntax Description

incoming	Incoming COR.
outgoing	Outgoing COR.
cor-list-name	COR list name.

Defaults

No default behavior or values.

Command Modes

Ephone-dn configuration

Command History

Release	Modification
12.1(5)YD	This command was introduced on the Cisco 2600 series and Cisco 3600 series multiservice routers, and Cisco IAD2420 routers.

Usage Guidelines

The **cor** command sets the dial-peer COR parameter for dial peers associated with the directory number. The COR functionality provides the ability to deny certain call attempts based on the incoming and outgoing class of restrictions provisioned on the dial peers. This functionality provides flexibility in network design, allows users to block calls (for example, to 900 numbers), and applies different restrictions to call attempts from different originators.

COR is used to specify which incoming dial peer can use which outgoing dial peer to make a call. Each dial peer can be provisioned with an incoming and an outgoing COR list.

Examples

The following example shows how to set dial-peer COR parameter for incoming calls to dial-peer 1:

```
Router(config)# ephone-dn 1
Router(config-ephone-dn)# cor incoming 1
```

Related Commands

Command	Description
ephone-dn	Enters the ephone-dn configuration mode.

debug ephone detail

To set detail debugging for the Cisco IP phone, use the **debug ephone detail** debug command. To disable debugging, use the **no** form of this command.

debug ephone detail [**mac-address** *mac-address*]

no debug ephone detail [**mac-address** *mac-address*]

Syntax Description

mac-address	(Optional) Defines the MAC address of the Cisco IP phone.
mac-address	(Optional) Specifies the MAC address of the Cisco IP phone.

Defaults

No default behavior or values.

Command History

Release	Modification
12.1(5)YD	This command was introduced on the Cisco 2600 series and Cisco 3600 series multiservice routers, and Cisco IAD2420 routers.

Usage Guidelines

The **debug ephone detail** command includes the error and state levels.

If the **mac-address** keyword is not used, the **debug ephone detail** debug command debugs all Cisco IP phones that are registered to the router. You can remove debugging for the Cisco IP phones that you do not want to debug by using the **mac-address** keyword with the **no** form of this command.

Debugging can be enabled or disabled on any number of Cisco IP phones. The Cisco IP phones that have debugging enabled can be seen by entering the **show ephone** command and looking at the debug field in the output. When debugging is enabled for a Cisco IP phone, the debug output is displayed for any Cisco IP phone directory numbers associated with the Cisco IP phone.

Examples

The following example shows a sample output of detail debugging of the Cisco IP phone with MAC address 0030.94c3.8724. The sample is an excerpt of some of the activities that takes place during call setup, connected state, active call, and the call being disconnected:

```
Router# debug ephone detail mac-address 0030.94c3.8724
Ephone detail debugging is enabled

1d04h: ephone-1[1]:OFFHOOK
.
.
1d04h: Skinny Call State change for DN 1 SIEZE
.
.
1d04h: ephone-1[1]:SetCallState line 1 DN 1 TsOffHook
.
.
1d04h: ephone-1[1]:SetLineLamp 1 to ON
.
.
1d04h: ephone-1[1]:KeypadButtonMessage 5
```

```
.
.
1d04h: ephone-1[1]:KeypadButtonMessage 0
.
.
1d04h: ephone-1[1]:KeypadButtonMessage 0
.
.
1d04h: ephone-1[1]:KeypadButtonMessage 2
.
.
1d04h: ephone-1[1]:Store ReDial digit: 5002
.
SkinnyTryCall to 5002 instance 1
.
.
1d04h: ephone-1[1]:Store ReDial digit: 5002
1d04h: ephone-1[1]:
SkinnyTryCall to 5002 instance 1
.
.
1d04h: Skinny Call State change for DN 1 ALERTING
.
.
1d04h: ephone-1[1]:SetCallState line 1 DN 1 TsRingOut
.
.
1d04h: ephone-1[1]:SetLineLamp 1 to ON
1d04h: SetCallInfo calling dn 1 dn 1
calling [5001] called [5002]
.
.
1d04h: ephone-1[1]: Jane calling
1d04h: ephone-1[1]: Jill
.
.
1d04h: SkinnyUpdateDnState by EFXS_RING_GENERATE
  for DN 2 to state RINGING
.
.
1d04h: SkinnyGetCallState for DN 2 CONNECTED
.
.
1d04h: ephone-1[1]:SetLineLamp 3 to ON
1d04h: ephone-1[1]:UpdateCallState DN 1 state 4 calleddn 2
.
.
1d04h: Skinny Call State change for DN 1 CONNECTED
.
.
1d04h: ephone-1[1]:OpenReceive DN 1 codec 4:G711Ulaw64k  duration 10 ms bytes 80
.
.
1d04h: ephone-1[1]:OpenReceiveChannelAck 1.2.172.21 port=20180
1d04h: ephone-1[1]:Outgoing calling DN 1 Far-ephone-2 called DN 2
1d04h: SkinnyGetCallState for DN 1 CONNECTED
.
.
1d04h: ephone-1[1]:SetCallState line 3 DN 2 TsOnHook
.
.
1d04h: ephone-1[1]:SetLineLamp 3 to OFF
.
.
```

```
1d04h: ephone-1[1]:SetCallState line 1 DN 1 TsOnHook
.
.
1d04h: ephone-1[1]:Clean Up Speakerphone state
1d04h: ephone-1[1]:SpeakerPhoneOnHook
1d04h: ephone-1[1]:Clean up activeline 1
1d04h: ephone-1[1]:StopTone sent to ephone
1d04h: ephone-1[1]:Clean Up phone offhook state
1d04h: SkinnyGetCallState for DN 1 IDLE
1d04h: called DN -1, calling DN -1 phone -1
1d04h: ephone-1[1]:SetLineLamp 1 to OFF
1d04h: UnBinding ephone-1 from DN 1
1d04h: UnBinding called DN 2 from DN 1
1d04h: ephone-1[1]:ONHOOK
1d04h: ephone-1[1]:SpeakerPhoneOnHook
1d04h: ephone-1[1]:ONHOOK NO activeline
.
.
.
```

Related Commands

Command	Description
debug ephone error	Sets error debugging for the Cisco IP phone.
debug ephone keepalive	Sets keepalive debugging for the Cisco IP phone.
debug ephone pak	Provides voice packet level debugging and prints the contents of one voice packet in every 1024 voice packets.
debug ephone raw	Provides raw low-level protocol debugging display for all Skinny Client Control Protocol messages
debug ephone register	Sets registration debugging for the Cisco IP phone.
debug ephone state	Sets state debugging for the Cisco IP phone.
debug ephone statistics	Sets statistics debugging for the Cisco IP phone.
show debugging	Displays information about the types of debugging that are enabled for your router.

debug ephone error

To set error debugging for the Cisco IP phone, use the **debug ephone error** debug command. To disable debugging, use the **no** form of this command.

debug ephone error [**mac-address** *mac-address*]

no debug ephone error [**mac-address** *mac-address*]

Syntax Description

mac-address	(Optional) Defines the MAC address of the Cisco IP phone.
mac-address	(Optional) Specifies the MAC address of the Cisco IP phone.

Defaults

No default behavior or values.

Command History

Release	Modification
12.1(5)YD	This command was introduced on the Cisco 2600 series and Cisco 3600 series multiservice routers, and Cisco IAD2420 routers.

Usage Guidelines

The **debug phone error** command cancels debugging at the detail and state level.

If the **mac-address** keyword is not used, the **debug ephone error** debug command debugs all Cisco IP phones that are registered to the router. You can remove debugging for the Cisco IP phones that you do not want to debug by using the **mac-address** keyword with the **no** form of this command.

Debugging can be enabled or disabled on any number of Cisco IP phones. The Cisco IP phones that have debugging enabled can be seen by entering the **show ephone** command and looking at the debug field in the output. When debugging is enabled for a Cisco IP phone, the debug output is displayed for any Cisco IP phone directory numbers associated with the Cisco IP phone.

Examples

The following example shows a sample output of error debugging for the Cisco IP phone with MAC address 0030.94c3.8724:

```
Router# debug ephone error mac-address 0030.94c3.8724
EPHONE error debugging is enabled

socket [2] send ERROR 11
Skinny Socket [2] retry failure
```

Related Commands

Command	Description
debug ephone detail	Sets detail debugging for the Cisco IP phone.
debug ephone keepalive	Sets keepalive debugging for the Cisco IP phone.
debug ephone pak	Provides voice packet level debugging and prints the contents of one voice packet in every 1024 voice packets.

Command	Description
debug ephone raw	Provides raw low-level protocol debugging display for all Skinny Client Control Protocol messages
debug ephone register	Sets registration debugging for the Cisco IP phone.
debug ephone state	Sets state debugging for the Cisco IP phone.
debug ephone statistics	Sets statistics debugging for the Cisco IP phone.
show debugging	Displays information about the types of debugging that are enabled for your router.

debug ephone keepalive

To set keepalive debugging for the Cisco IP phone, use the **debug ephone keepalive** debug command. To disable debugging, use the **no** form of this command.

debug ephone keepalive [**mac-address** *mac-address*]

no debug ephone keepalive [**mac-address** *mac-address*]

Syntax Description

mac-address	(Optional) Defines the MAC address of the Cisco IP phone.
mac-address	(Optional) Specifies the MAC address of the Cisco IP phone.

Defaults

No default behavior or values.

Command History

Release	Modification
12.1(5)YD	This command was introduced on the Cisco 2600 series and Cisco 3600 series multiservice routers, and Cisco IAD2420 routers.

Usage Guidelines

The **debug ephone keepalive** command sets keepalive debugging.

If the **mac-address** keyword is not used, the **debug ephone keepalive** debug command debugs all Cisco IP phones that are registered to the router. You can remove debugging for the Cisco IP phones that you do not want to debug by using the **mac-address** keyword with the **no** form of this command.

Debugging can be enabled or disabled on any number of Cisco IP phones. The Cisco IP phones that have debugging enabled can be seen by entering the **show ephone** command and looking at the debug field in the output. When debugging is enabled for a Cisco IP phone, the debug output is displayed for any Cisco IP phone directory numbers associated with the Cisco IP phone.

Examples

The following example shows a sample output of the keepalive status for the Cisco IP phone with MAC address 0030.94C3.E1A8:

```
Router# debug ephone keepalive mac-address 0030.94c3.E1A8
EPHONE keepalive debugging is enabled for phone 0030.94C3.E1A8

1d05h: ephone-1 Set interface FastEthernet0/0  ETHERNET
1d05h: ephone-1[1]:Keepalive socket[1] SEP003094C3E1A8
1d05h: ephone-1 Set interface FastEthernet0/0  ETHERNET
1d05h: ephone-1[1]:Keepalive socket[1] SEP003094C3E1A8
1d05h: Skinny Checking for stale sockets
1d05h: ephone-1 Set interface FastEthernet0/0  ETHERNET
1d05h: ephone-1[1]:Keepalive socket[1] SEP003094C3E1A8
1d05h: ephone-1 Set interface FastEthernet0/0  ETHERNET
1d05h: ephone-1[1]:Keepalive socket[1] SEP003094C3E1A8
1d05h: Skinny active socket list (3/96):  1 2 4
```

Related Commands

Command	Description
debug ephone detail	Sets detail debugging for the Cisco IP phone.
debug ephone error	Sets error debugging for the Cisco IP phone.
debug ephone pak	Provides voice packet level debugging and prints the contents of one voice packet in every 1024 voice packets.
debug ephone raw	Provides raw low-level protocol debugging display for all Skinny Client Control Protocol messages
debug ephone register	Sets registration debugging for the Cisco IP phone.
debug ephone state	Sets state debugging for the Cisco IP phone.
debug ephone statistics	Sets statistics debugging for the Cisco IP phone.
show debugging	Displays information about the types of debugging that are enabled for your router.

debug ephone pak

To provide voice packet level debugging and to print the contents of one voice packet in every 1024 voice packets, use the **debug ephone pak** debug command. To disable debugging, use the **no** form of this command.

debug ephone pak [**mac-address** *mac-address*]

no debug ephone pak [**mac-address** *mac-address*]

Syntax Description

mac-address	(Optional) Defines the MAC address of the Cisco IP phone.
mac-address	(Optional) Specifies the MAC address of the Cisco IP phone.

Defaults

No default behavior or values.

Command History

Release	Modification
12.1(5)YD	This command was introduced on the Cisco 2600 series and Cisco 3600 series multiservice routers, and Cisco IAD2420 routers.

Usage Guidelines

The **debug ephone pak** command provides voice packet level debugging and prints the contents of one voice packet in every 1024 voice packets.

If the **mac-address** keyword is not used, the **debug ephone pak** debug command debugs all Cisco IP phones that are registered to the router. You can remove debugging for the Cisco IP phones that you do not want to debug by using the **mac-address** keyword with the **no** form of this command.

Debugging can be enabled or disabled on any number of Cisco IP phones. The Cisco IP phones that have debugging enabled can be seen by entering the **show ephone** command and looking at the debug field in the output. When debugging is enabled for a Cisco IP phone, the debug output is displayed for any Cisco IP phone directory numbers associated with the Cisco IP phone.

Examples

The following example shows a sample output of packet debugging for the Cisco IP phone with MAC address 0030.94c3.8724:

```
Router# debug ephone pak mac-address 0030.94c3.8724
EPHONE packet debugging is enabled

01:29:14: ***ph_xmit_ephone DN 3 tx_pkts 5770 dest=10.2.1.1 orig len=32
 pakcopy=0 discards 27 ip_enctype 0 0 last discard: unsupported payload type
01:29:14: to_skinny_duration 130210 offset -30 last -40 seq 0 adj 0
01:29:14: IP:   45B8 003C 0866 0000 3F11 3F90 2800 0001 0A02 0101
01:29:14: TTL 63 TOS B8 prec 5
01:29:14: UDP:  07D0 6266 0028 0000
01:29:14: sport 2000 dport 25190 length 40 checksum 0
01:29:14: RTP:  8012 16AF 9170 6409 0E9F 0001
01:29:14: is_rtp:1 is_frf11:0 vlen:0 delta_t:160 vofr1:0 vofr2:0
scodec:11 rtp_bits:8012 rtp_codec:18 last_bad_payload 19
01:29:14: vencap FAILED
```

```
01:29:14: PROCESS SWITCH
01:29:15: %SYS-5-CONFIG_I: Configured from console by console
01:29:34: ***SkinnyPktIp DN 3 10.2.1.1 to 40.0.0.1 pkts 4880 FAST sw
01:29:34: from_skinny_duration 150910
01:29:34: nw 3BBC2A8 addr 3BBC2A4 mac 3BBC2A4 dg 3BBC2C4 dgs 2A
01:29:34: MAC:  1841 0800
01:29:34: IP:   45B8 0046 682E 0000 3E11 E0BD 0A02 0101 2800 0001
01:29:34: TTL 62 TOS B8 prec 5
01:29:34: UDP:  6266 07D0 0032 0000
01:29:34: sport 25190 dport 2000 length 50 checksum 0
01:29:34: RTP:  8012 55FF 0057 8870 3AF4 C394
01:29:34: RTP: rtp_bits 8012 seq 55FF ts 578870 ssrc 3AF4C394
01:29:34: PAYLOAD:
01:29:34:       1409 37C9 54DE 449C 3B42 0446 3AAB 182E
01:29:34:       56BC 5184 58E5 56D3 13BE 44A7 B8C4
01:29:34:
01:29:37: ***ph_xmit_ephone DN 3 tx_pkts 6790 dest=10.2.1.1 orig len=32
 pakcopy=0 discards 31 ip_enctype 0 0 last discard: unsupported payload type
01:29:37: to_skinny_duration 153870 offset -150 last -40 seq 0 adj 0
01:29:37: IP:   45B8 003C 0875 0000 3F11 3F81 2800 0001 0A02 0101
01:29:37: TTL 63 TOS B8 prec 5
01:29:37: UDP:  07D0 6266 0028 0000
01:29:37: sport 2000 dport 25190 length 40 checksum 0
01:29:37: RTP:  8012 1AAF 9173 4769 0E9F 0001
01:29:37: is_rtp:1 is_frf11:0 vlen:0 delta_t:160 vofr1:0 vofr2:0
```

Related Commands

Command	Description
debug ephone detail	Sets detail debugging for the Cisco IP phone.
debug ephone error	Sets error debugging for the Cisco IP phone.
debug ephone keepalive	Sets keepalive debugging for the Cisco IP phone.
debug ephone raw	Provides raw low-level protocol debugging display for all Skinny Client Control Protocol messages
debug ephone register	Sets registration debugging for the Cisco IP phone.
debug ephone state	Sets state debugging for the Cisco IP phone.
debug ephone statistics	Sets statistics debugging for the Cisco IP phone.
show debugging	Displays information about the types of debugging that are enabled for your router.

debug ephone raw

To provide raw low-level protocol debugging display for all Skinny Client Control Protocol messages, use the **debug ephone raw** debug command. To disable debugging, use the **no** form of this command.

debug ephone raw [**mac-address** *mac-address*]

no debug ephone raw [**mac-address** *mac-address*]

Syntax Description

mac-address	(Optional) Defines the MAC address of the Cisco IP phone.
mac-address	(Optional) Specifies the MAC address of the Cisco IP phone.

Defaults

No default behavior or values.

Command History

Release	Modification
12.1(5)YD	This command was introduced on the Cisco 2600 series and Cisco 3600 series multiservice routers, and Cisco IAD2420 routers.

Usage Guidelines

The **debug ephone raw** command provides raw low-level protocol debug display for all Skinny Client Control Protocol messages. The debug display provides byte level display of Skinny TCP socket messages.

If the **mac-address** keyword is not used, the **debug ephone raw** debug command debugs all Cisco IP phones that are registered to the router. You can remove debugging for the Cisco IP phones that you do not want to debug by using the **mac-address** keyword with the **no** form of this command.

Debugging can be enabled or disabled on any number of Cisco IP phones. The Cisco IP phones that have debugging enabled can be seen by entering the **show ephone** command and looking at the debug field in the output. When debugging is enabled for a Cisco IP phone, the debug output is displayed for any Cisco IP phone directory numbers associated with the Cisco IP phone.

Examples

The following example shows a sample output of raw protocol debugging for the Cisco IP phone with MAC address 0030.94C3.E1A8:

```
Router# debug ephone raw mac-address 0030.94c3.E1A8
EPHONE raw protocol debugging is enabled for phone 0030.94C3.E1A8

1d05h: skinny socket received 4 bytes on socket [1]
0  0  0  0
1d05h:
1d05h: SkinnyMessageID = 0
1d05h: skinny send 4 bytes
4  0  0  0  0  0  0  0  0  1  0  0
1d05h: socket [1] sent 12 bytes OK (incl hdr) for ephone-(1)

1d06h: skinny socket received 4 bytes on socket [1]
0  0  0  0
1d06h:
```

```
1d06h: SkinnyMessageID = 0
1d06h: skinny send 4 bytes
4  0  0  0  0  0  0  0  0  1  0  0
1d06h: socket [1] sent 12 bytes OK (incl hdr) for ephone-(1)
```

Related Commands

Command	Description
debug ephone detail	Sets detail debugging for the Cisco IP phone.
debug ephone error	Sets error debugging for the Cisco IP phone.
debug ephone keepalive	Sets keepalive debugging for the Cisco IP phone.
debug ephone pak	Provides voice packet level debugging and prints the contents of one voice packet in every 1024 voice packets.
debug ephone register	Sets registration debugging for the Cisco IP phone.
debug ephone state	Sets state debugging for the Cisco IP phone.
debug ephone statistics	Sets statistics debugging for the Cisco IP phone.
show debugging	Displays information about the types of debugging that are enabled for your router.

debug ephone register

To set registration debugging for the Cisco IP phone, use the **debug ephone register** debug command. To disable debugging, use the **no** form of this command.

debug ephone register [**mac-address** *mac-address*]

no debug ephone register [**mac-address** *mac-address*]

Syntax Description

mac-address	(Optional) Defines the MAC address of the Cisco IP phone.
mac-address	(Optional) Specifies the MAC address of the Cisco IP phone.

Defaults

No default behavior or values.

Command History

Release	Modification
12.1(5)YD	This command was introduced on the Cisco 2600 series and Cisco 3600 series multiservice routers, and Cisco IAD2420 routers.

Usage Guidelines

The **debug ephone register** command sets registration debugging for the Cisco IP phones.

If the **mac-address** keyword is not used, the **debug ephone register** debug command debugs all Cisco IP phones that are registered to the router. You can remove debugging for the Cisco IP phones that you do not want to debug by using the **mac-address** keyword with the **no** form of this command.

Debugging can be enabled or disabled on any number of Cisco IP phones. The Cisco IP phones that have debugging enabled can be seen by entering the **show ephone** command and looking at the debug field in the output. When debugging is enabled for a Cisco IP phone, the debug output is displayed for any Cisco IP phone directory numbers associated with the Cisco IP phone.

Syntax Description

The following example shows a sample output of registration debugging for the Cisco IP phone with MAC address 0030.94c3.8724:

```
Router# debug ephone register mac-address 0030.94c3.8724
Ephone registration debugging is enabled

1d06h: New Skinny socket accepted [1] (2 active)
1d06h: sin_family 2, sin_port 50778, in_addr 10.1.0.21
1d06h: skinny_add_socket 1 10.1.0.21 50778
1d06h: ephone-(1)[1] StationRegisterMessage (2/3/12) from 10.1.0.21
1d06h: ephone-(1)[1] Register StationIdentifier DeviceName SEP003094C3E1A8
1d06h: ephone-(1)[1] StationIdentifier Instance 1    deviceType 7
1d06h: ephone-1[-1]:stationIpAddr 10.1.0.21
1d06h: ephone-1[-1]:maxStreams 0
1d06h: ephone-(1) Allow any Skinny Server IP address 10.1.0.6
.
.
1d06h: ephone-1[1]:RegisterAck sent to ephone 1: keepalive period 30
.
.
```

Related Commands

Command	Description
debug ephone detail	Sets detail debugging for the Cisco IP phone.
debug ephone error	Sets error debugging for the Cisco IP phone.
debug ephone keepalive	Sets keepalive debugging for the Cisco IP phone.
debug ephone pak	Provides voice packet level debugging and prints the contents of one voice packet in every 1024 voice packets.
debug ephone raw	Provides raw low-level protocol debugging display for all Skinny Client Control Protocol messages
debug ephone state	Sets state debugging for the Cisco IP phone.
debug ephone statistics	Sets statistics debugging for the Cisco IP phone.
show debugging	Displays information about the types of debugging that are enabled for your router.

debug ephone state

To set state debugging for the Cisco IP phone, use the **debug ephone state** debug command. To disable debugging, use the **no** form of this command.

debug ephone state [**mac-address** *mac-address*]

no debug ephone state [**mac-address** *mac-address*]

Syntax Description

mac-address	(Optional) Defines the MAC address of the Cisco IP phone.
mac-address	(Optional) Specifies the MAC address of the Cisco IP phone.

Defaults

No default behavior or values.

Command History

Release	Modification
12.1(5)YD	This command was introduced on the Cisco 2600 series and Cisco 3600 series multiservice routers, and Cisco IAD2420 routers.

Usage Guidelines

The **debug ephone state** command sets state debugging for the Cisco IP phones.

If the **mac-address** keyword is not used, the **debug ephone state** debug command debugs all Cisco IP phones that are registered to the router. You can remove debugging for the Cisco IP phones that you do not want to debug by using the **mac-address** keyword with the **no** form of this command.

Debugging can be enabled or disabled on any number of Cisco IP phones. The Cisco IP phones that have debugging enabled can be seen by entering the **show ephone** command and looking at the debug field in the output. When debugging is enabled for a Cisco IP phone, the debug output is displayed for any Cisco IP phone directory numbers associated with the Cisco IP phone.

Examples

The following example shows a sample output of state debugging for the Cisco IP phone with MAC address 0030.94c3.E1A8:

```
Router# debug ephone state mac-address 0030.94c3.E1A8
EPHONE state debugging is enabled for phone 0030.94C3.E1A8

1d06h: ephone-1[1]:OFFHOOK
1d06h: ephone-1[1]:SIEZE on activeline 0
1d06h: ephone-1[1]:SetCallState line 1 DN 1 TsOffHook
1d06h: ephone-1[1]:Skinny-to-Skinny call DN 1 to DN 2 instance 1
1d06h: ephone-1[1]:SetCallState line 1 DN 1 TsRingOut
1d06h: ephone-1[1]:Call Info DN 1 line 1 ref 158 called 5002 calling 5001
1d06h: ephone-1[1]: Jane calling
1d06h: ephone-1[1]: Jill
1d06h: ephone-1[1]:SetCallState line 3 DN 2 TsRingIn
1d06h: ephone-1[1]:Call Info DN 2 line 3 ref 159 called 5002 calling 5001
1d06h: ephone-1[1]: Jane calling
1d06h: ephone-1[1]: Jill
1d06h: ephone-1[1]:SetCallState line 3 DN 2 TsCallRemoteMultiline
1d06h: ephone-1[1]:SetCallState line 1 DN 1 TsConnected
```

```
1d06h: ephone-1[1]:OpenReceive DN 1 codec 4:G711Ulaw64k  duration 10 ms bytes 80
1d06h: ephone-1[1]:OpenReceiveChannelAck 1.2.172.21 port=24010
1d06h: ephone-1[1]:StartMedia 1.2.172.22 port=24612
1d06h: DN 1 codec 4:G711Ulaw64k duration 10 ms bytes 80
1d06h: ephone-1[1]:CloseReceive
1d06h: ephone-1[1]:StopMedia
1d06h: ephone-1[1]:SetCallState line 3 DN 2 TsOnHook
1d06h: ephone-1[1]:SetCallState line 1 DN 1 TsOnHook
1d06h: ephone-1[1]:SpeakerPhoneOnHook
1d06h: ephone-1[1]:ONHOOK
1d06h: ephone-1[1]:SpeakerPhoneOnHook
1d06h: SkinnyReportDnState DN 1 ONHOOK
```

Related Commands

Command	Description
debug ephone detail	Sets detail debugging for the Cisco IP phone.
debug ephone error	Sets ephone debugging for the Cisco IP phone.
debug ephone keepalive	Sets keepalive debugging for the Cisco IP phone.
debug ephone pak	Provides voice packet level debugging and prints the contents of one voice packet in every 1024 voice packets.
debug ephone raw	Provides raw low-level protocol debugging display for all Skinny Client Control Protocol messages
debug ephone register	Sets registration debugging for the Cisco IP phone.
debug ephone statistics	Sets statistics debugging for the Cisco IP phone.
show debugging	Displays information about the types of debugging that are enabled for your router.

debug ephone statistics

To set call statistics debugging for the Cisco IP phone, use the **debug ephone statistics** debug command. To disable debugging, use the **no** form of this command.

debug ephone statistics [**mac-address** *mac-address*]

no debug ephone statistics [**mac-address** *mac-address*]

Syntax Description

mac-address	(Optional) Defines the MAC address of the Cisco IP phone.
mac-address	(Optional) Specifies the MAC address of the Cisco IP phone.

Defaults

No default behavior or values.

Command History

Release	Modification
12.1(5)YD	This command was introduced on the Cisco 2600 series and Cisco 3600 series multiservice routers, and Cisco IAD2420 routers.

Usage Guidelines

The **debug ephone statistics** command provides a debug monitor display of the periodic messages from the Cisco IP phone to the router. These include transmit-and-receive packet counts and an estimate of drop packets. The call statistics can also be displayed for live calls using the **show ephone** command.

If the **mac-address** keyword is not used, the **debug ephone statistics** debug command debugs all Cisco IP phones that are registered to the router. You can remove debugging for the Cisco IP phones that you do not want to debug by using the **mac-address** keyword with the **no** form of this command.

Debugging can be enabled or disabled on any number of Cisco IP phones. The Cisco IP phones that have debugging enabled can be seen by entering the **show ephone** command and looking at the debug field in the output. When debugging is enabled for a Cisco IP phone, the debug output is displayed for any Cisco IP phone directory numbers associated with the Cisco IP phone.

Examples

The following example shows a sample output of statistics debugging for the Cisco IP phone with MAC address 0030.94C3.E1A8:

```
Router# debug ephone statistics mac-address 0030.94C3.E1A8
EPHONE statistics debugging is enabled for phone 0030.94C3.E1A8

1d06h: Clear Call Stats for DN 1 call ref 162
1d06h: Clear Call Stats for DN 1 call ref 162
1d06h: Clear Call Stats for DN 1 call ref 162
1d06h: Clear Call Stats for DN 2 call ref 163
1d06h: ephone-1[1]:GetCallStats line 1 ref 162 DN 1: 5001
1d06h: ephone-1[1]:Call Stats for line 1 DN 1 5001 ref 162
1d06h: ephone-1[1]:TX Pkts 0 bytes 0 RX Pkts 0 bytes 0
1d06h: ephone-1[1]:Pkts lost 4504384 jitter 0 latency 0
1d06h: ephone-1[1]:Src 0.0.0.0 0 Dst 0.0.0.0 0 bytes 80 vad 0 G711Ulaw64k
1d06h: ephone-1[1]:GetCallStats line 1 ref 162 DN 1: 5001
1d06h: STATS: DN 1 Packets Sent 0
```

```
1d06h: STATS: DN 2 Packets Sent 0
1d06h: ephone-1[1]:Call Stats found DN -1 from Call Ref 162
1d06h: ephone-1[1]:Call Stats for line 0 DN -1 5001 ref 162
1d06h: ephone-1[1]:TX Pkts 275 bytes 25300 RX Pkts 275 bytes 25300
1d06h: ephone-1[1]:Pkts lost 0 jitter 0 latency 0
```

Related Commands

Command	Description
debug ephone detail	Sets detail debugging for the Cisco IP phone.
debug ephone error	Sets error debugging for the Cisco IP phone.
debug ephone keepalive	Sets keepalive debugging for the Cisco IP phone.
debug ephone pak	Provides voice packet level debugging and prints the contents of one voice packet in every 1024 voice packets.
debug ephone raw	Provides raw low-level protocol debugging display for all Skinny Client Control Protocol messages
debug ephone register	Sets registration debugging for the Cisco IP phone.
debug ephone state	Sets state debugging for the Cisco IP phone.
show debugging	Displays information about the types of debugging that are enabled for your router.

dialplan-pattern (keyswitch)

To create a global prefix that can be used to expand the abbreviated extension numbers into fully qualified E.164 numbers, use the **dialplan-pattern** keyswitch configuration command. To disable, use the **no** form of this command.

dialplan-pattern *tag pattern* **extension-length** *number*

no dialplan-pattern *tag* [*pattern* **extension-length** *number*]

Syntax Description

tag	Dial-plan string tag used before a ten-digit telephone number. The tag number is from 1 to 5.
pattern	Dial-plan pattern, such as the area code, the prefix, and the first one or two digits of the extension number.
extension-length	The number of extension digits.
number	The number of digits.

Defaults

No default behavior or values.

Command Modes

Keyswitch configuration

Command History

Release	Modification
12.1(5)YD	This command was introduced on the Cisco 2600 series and Cisco 3600 series multiservice routers, and Cisco IAD2420 routers.

Usage Guidelines

Directory numbers for the Cisco IP phones are expected to be entered in extension number format. The extension number should be greater or equal to the extension length. Otherwise, the extension number cannot be converted to a qualified E.164 number. The **dialplan-pattern** command creates a global prefix that can be used to expand the abbreviated extension numbers to fully qualified E.164 numbers. The dialplan-pattern is also required to register the Cisco IP phone lines with a gatekeeper. The **dialplan-pattern** command can resolve an incoming call with a full E.164 number to a Cisco IP phone extension number.

The **extension-length** keyword enables the system to convert a full E.164 telephone number back to an extension number for the purposes of caller-ID display, received, and missed call lists. For example, a company uses extension number range 5000-5099 across several sites, with only the extensions 5000-5009 present on the local router. An incoming call from 5044 arrives from the company's internal VoIP H.323 network and this call includes the calling number as 4083335044 in its full E.164 format.

Examples

The following example shows how to create dialplan-pattern 1 for extension numbers 5001 to 5099 with the telephone prefix starting with 408333. If the following example is set, the routers sees that the 4083335044 matches dialplan-pattern 1, and uses the **extension-length** keyword to extract the last four digits of the number 5044 and present this as the caller ID for the incoming call.

```
Router(config)# keyswitch
Router(config-keyswitch)# dialplan-pattern 1 40833350.. extension-length 4
```

Related Commands

Command	Description
ephone	Enters ephone configuration mode.
ephone-dn	Enters the ephone-dn configuration mode.
keyswitch	Enables IP Keyswitch support and enters keyswitch configuration mode.

ephone

To enter the ephone configuration mode, use the **ephone** global configuration command. To disable the Ethernet phone configuration mode, use the **no** form of this command.

ephone *tag*

no ephone *tag*

Syntax Description

tag	Ethernet phone tag. The phone limit is platform dependent: • Maximum 24 Cisco IP phones for the Cisco 2600 series, Cisco 3620, and Cisco IAD2420 routers • Maximum 48 Cisco IP phones for the Cisco 3640 and Cisco 3660 multiservice routers

Defaults

No Cisco IP phone is configured.

Command Modes

Global configuration

Command History

Release	Modification
12.1(5)YD	This command was introduced on the Cisco 2600 series and Cisco 3600 series multiservice routers, and Cisco IAD2420 routers.

Usage Guidelines

This is a top-level command to configure Cisco IP phones on the IP Keyswitch router. By default, no Cisco IP phone is configured. Therefore, you must manually enter the number of Cisco IP phones you need to configure in your network by entering the **max-ephones** and **max-dn** commands.

Examples

The following example shows how to enter the ephone configuration mode for phone 4:

```
Router(config)# ephone 4
Router(config-ephone)#
```

Related Commands

Command	Description
button	Assigns a button number to the Cisco IP phone directory number.
ephone-dn	Enters the ephone-dn configuration mode.
keyswitch	Enables IP Keyswitch support and enters keyswitch configuration mode.
mac-address	Configures the MAC address of the Cisco IP phone
max-dn	Sets the maximum number of directory numbers that can be supported by the router.

Command	Description
max-ephones	Configures the maximum number of Cisco IP phones that can be supported by the router.
reset	Resets the Cisco IP phones in the ephone configuration mode.
speed-dial	Sets speed-dial buttons on a Cisco IP phone.

ephone-dn

To configure the directory numbers for the Cisco IP phone lines and to enter ephone-dn configuration mode, use the **ephone-dn** global configuration command. To disable the directory numbers for the Cisco IP phone lines, use the **no** form of this command.

ephone-dn *dn-tag*

no ephone-dn *dn-tag*

Syntax Description

dn-tag	The directory number is platform dependent: • Maximum 48 for the Cisco 2600 series, Cisco 3620, and Cisco IAD2420 routers • Maximum 96 for the Cisco 3640 and Cisco 3660 multiservice routers

Defaults

No directory number is configured.

Command Modes

Global configuration

Command History

Release	Modification
12.1(5)YD	This command was introduced on the Cisco 2600 series and Cisco 3600 series multiservice routers, and Cisco IAD2420 routers.

Usage Guidelines

This is a top-level command to configure Cisco IP phones on the IP Keyswitch router. By default, no directory number is configured. Therefore, you must manually enter the number of Cisco IP phones you need to configure in your network by entering the **max-ephones** and **max-dn** commands.

Examples

The following example shows how to configure the directory numbers for the Cisco IP phone lines and enters the ephone-dn configuration mode:

```
Router(config)# ephone-dn 1
Router(config-ephone-dn)#
```

Related Commands

Command	Description
call-forward all	Configures call-forwarding for all the incoming calls on one of the lines of a Cisco IP phone to another telephone.
call-forward busy	Configures call-forwarding to another number when the Cisco IP phone is busy.
call-forward noan	Configures call-forwarding to another number when no answer is received from the Cisco IP phone.

Command	Description
caller-id	Configures caller-ID display and blocking for a Cisco IP phone.
cor	Configures a class of restriction (COR) on the dial peers associated with a directory number.
ephone	Enters ephone configuration mode.
huntstop	Sets the huntstop attribute for the dial peers associated with the Cisco IP phone lines.
keyswitch	Enables IP Keyswitch support and enters keyswitch configuration mode.
max-dn	Sets the maximum number of directory numbers that can be supported by the router.
max-ephones	Configures the maximum number of Cisco IP phones that can be supported by the router.
name	Configures a user name associated with a directory number.
number	Configures a valid number for the Cisco IP phone.
preference	Sets preference for the attached dial peer for a directory number.

huntstop (ephone-dn)

To set the huntstop attribute for the dial peers associated with the Cisco IP phone lines, use the **huntstop** ephone-dn configuration command. To disable huntstop, use the **no** form of this command.

huntstop

no huntstop

Syntax Description

This command has no arguments or keywords.

Defaults

Huntstop is set by default.

Command Modes

Ephone-dn configuration

Command History

Release	Modification
12.1(5)YD	This command was introduced.

Usage Guidelines

In the ephone-dn configuration mode, the huntstop attribute is set by default for the dial peers associated with the Cisco IP phone lines on a line-by-line basis. This allows you to prevent hunt-on-busy from redirecting a call to a busy phone into a dial-peer setup with a catch-all default destination.

Note Use the **no huntstop** command only if you want to disable huntstop.

Examples

The following example shows how to disable huntstop to the destination dial peer with the extension 5001. The huntstop for the dial-peer is set to OFF and prevents calls to extension 5001 from being re-routed to the on-net H-323 dial-peer for 5... (The three decimal points are used as wild cards.) destination when 5001 is busy.

```
Router(config)# ephone-dn 1
Router(config-ephone-dn) no huntstop
```

The following example shows a typical configuration where ephone-dn huntstop (default) is required:

```
ephone-dn 1
number 5001

ephone 4
button 1:1
mac-address 0030.94c3.8724

dial-peer voice 5000 voip
destination-pattern 5...
session target ipv4:223.223.223.223
```

In the previous example, the huntstop attribute is set to ON by default and prevents calls to extension 5001 from being re-routed to the on-net H.323 dial-peer for 5... when the 5001 extension is busy.

The following example shows another example where huntstop is not desired and is explicitly disabled:

```
ephone-dn 1
number 5001
no huntstop
preference 1

ephone-dn 2
number 5001
preference 2
call-forward busy 6000
call-forward noan 6000

ephone 4
button 1:1 2:2
mac-address 0030.94c3.8724

dial-peer voice 6000 pots
destination-pattern 6000
huntstop
port 1/0/0
description answering-machine
```

In this example, ephone 4 is configured with two lines, each with the same extension number 5001. This is done in order to allow the second line to provide call waiting notification for extension number 5001 when the first line is in use. Setting no huntstop on the first line (ephone-dn 1) allows incoming calls to hunt to the second line (ephone-dn 2) on ephone 4 when the ephone-dn 1 line is busy.

The ephone-dn 2 has call forwarding set to extension 6000, which corresponds to a locally attached answering machine connected to a FXS voice-port. In this example, the POTS dial-peer for extension 6000 also has the dial-peer huntstop attribute explicitly set to prevent further hunting.

Related Commands

Command	Description
ephone-dn	Enters the ephone-dn configuration mode.
huntstop (dial-peer)	Disables all further dial-peer hunting if a call fails using hunt groups.

ip source-address (keyswitch)

To enable the router to receive messages from the Cisco IP phones through the specified IP addresses and ports, use the **ip source-address** keyswitch configuration command. To disable the router, use the **no** form of this command.

ip source-address *ip-address* [**port** *port*] [**any-match** | **strict-match**]

no ip source-address [*ip-address* **port** *port*] [**any-match** | **strict-match**]

Syntax Description

ip-address	The IP address is the preexisting router IP address, typically one of the addresses of the Ethernet port of the router.
port	(Optional) TCP/IP port used for Skinny Protocol.
port	(Optional) The port number.
any-match	(Optional) Disable strict IP address checking for registration.
strict-match	(Optional) Require strict IP address checking for registration.

Defaults

The default port is 2000.

The default for the server address match is **any-match**.

Command Modes

Keyswitch configuration

Command History

Release	Modification
12.1(5)YD	This command was introduced on the Cisco 2600 series and Cisco 3600 series multiservice routers, and Cisco IAD2420 routers.

Usage Guidelines

The **ip source-address** command is a mandatory command. The IP Keyswitch router does not start if the IP address and the port information are not provided. If the port number is not provided, then the default is port 2000. The IP address is usually the IP address of the Ethernet port to which the phones are connected.

Use the **any-match** keyword to instruct the router to permit Cisco IP phone registration and use the **strict-match** keyword to instruct the router to reject IP phone registration attempts if the IP server address used by the phone does not exactly match the source-address.

The **ip source-address** command enables the router to receive messages from the Cisco IP phones through the specified IP address and port.

The **ip source-address** command helps the router to autogenerate the SEPDEFAULT.cnf file, which is stored in the router Flash memory. The SEPDEFAULT.cnf file contains the IP address of one of the Ethernet ports of the router to which the phone should register. This file is specific to the router and cannot be shared by multiple routers. At some point, you must perform the following step to enable access to the SEPDEFAULT.cnf file:

```
Router# tftp-server flash:SEPDEFAULT.cnf
```

The Flash file system on some routers limits the number of times the Flash file can be written to or modified. After this limit is exceeded, the Flash memory must be manually erased and the files contained in the Flash file must be reloaded.

The **ip source-address** command can write or modify the SEPDEFAULT.cnf file only when parameters are actually changed. The file is not deleted by executing the **no ip source-address** command. However, the SEPDEFAULT.cnf file can be manually removed using the **delete** command.

If the **ip source-address** command is executed with changed parameters after the Flash file write limit is exceeded, the command fails. To see the detailed operation of the **ip source-address** command, turn on the **debug ephone detail** command.

Examples

The following example shows how to set the IP source address and port:

```
Router(config)# keyswitch
Router(config-keyswitch)# ip source-address 1.6.21.4 port 2000 strict-match
```

Related Commands

Command	Description
ephone	Enters ephone configuration mode.
ephone-dn	Enters the ephone-dn configuration mode.
keyswitch	Enables IP Keyswitch support and enters keyswitch configuration mode.
max-dn	Sets the maximum number of directory numbers that can be supported by the router.
max-ephones	Configures the maximum number of Cisco IP phones that can be supported by the router.
tftp-server	Enables TFTP access to .cnf file on the TFTP server so that the Cisco IP phone can get the file.

keepalive (keyswitch)

To configure the time interval between sending keepalive messages to the router used by the Cisco IP phones, use the **keepalive** keyswitch configuration command. To return to the default, use the **no** form of this command.

keepalive *seconds*

no keepalive *seconds*

Syntax Description

seconds	The interval time in seconds. The default timeout is set at 30 seconds.

Defaults

The default is 30 seconds.

Command Modes

Keyswitch configuration

Command History

Release	Modification
12.1(5)YD	This command was introduced on the Cisco 2600 series and Cisco 3600 series multiservice routers, and Cisco IAD2420 routers.

Usage Guidelines

The **keepalive** command configures the time interval between sending keepalive messages to the router used by the Cisco IP phone. If the router fails to receive three successive keepalive messages, it considers the phone to be out of service until the phone re-registers.

Examples

The following example shows how to set keepalive timeout at 60 seconds:

```
Router(config)# keyswitch
Router(config-keyswitch)# keepalive 60
```

Related Commands

Command	Description
ephone	Enters ephone configuration mode.
ephone-dn	Enters the ephone-dn configuration mode.
keyswitch	Enables IP Keyswitch support and enters keyswitch configuration mode.

keyswitch

To enable IP Keyswitch support and enter keyswitch configuration mode, use the **keyswitch** global configuration command. To disable IP Keyswitch support, use the **no** form of this command.

keyswitch

no keyswitch

Syntax Description

This command has no arguments or keywords.

Defaults

No default behavior or values.

Command Modes

Global configuration

Command History

Release	Modification
12.1(5)YD	This command was introduced on the Cisco 2600 series and Cisco 3600 series multiservice routers, and Cisco IAD2420 routers.

Usage Guidelines

The **keyswitch** command is the top-level command for all other commands related to keyswitch configuration.

Examples

The following example shows how to enter the keyswitch configuration mode:

```
Router(config)# keyswitch
Router(config-keyswitch)#
```

Related Commands

Command	Description
dialplan-pattern	Creates a global prefix that can be used to expand the abbreviated extension numbers into fully qualified E.164 numbers.
ephone	Enters ephone configuration mode.
ephone-dn	Enters the ephone-dn configuration mode.
ip source-address	Identifies the IP address and port number the keyswitch router uses for the IP phone service.
keepalive	Configures the time interval between sending keepalive messages to the router used by the Cisco IP phones.
load	Identifies the Cisco IP phone firmware image that you want the Cisco IP phone to use.
max-dn	Configures maximum number of directory numbers supported by the IP Keyswitch router.

Command	Description
max-ephones	Configures the maximum number of Cisco IP phones supported by the IP Keyswitch router.
reset	Resets the Cisco IP phone.
transfer-pattern	Allows transfer of telephone calls to other non-IP phone numbers.
voicemail	Configures the telephone number that is speed-dialed when the message button on a Cisco IP phone is pressed.

load (keyswitch)

To download a new phone image on the Cisco IP phones, use the **load** keyswitch configuration command. To disable a new phone image on the Cisco IP phones, use the **no** form of this command.

load {**7960-7940** | **7910**} *phone-image*

no load {**7960-7940** | **7910**} *phone-image*

Syntax Description

7960-7940	Selects the IP phone firmware load for Cisco IP Phone 7960 and Cisco IP phone 7940.
7910	Selects the IP phone firmware load for Cisco IP phone 7910.
phone-image	Selected Cisco IP phone firmware load image.

Defaults

No default behavior or values.

Command Modes

Keyswitch configuration

Command History

Release	Modification
12.1(5)YD	This command was introduced on the Cisco 2600 series and Cisco 3600 series multiservice routers, and Cisco IAD2420 routers.

Usage Guidelines

Use the **load** command to download a new phone image on the Cisco IP phones. You must enter this command for each type of phone. The Cisco IP Phone 7960 and Cisco IP Phone 7940 have the same phone load.

Note When you enter the **load** command, you do not use the extension of the file, for example, .bin.

Examples

The following example shows how to load the correct phone load firmware image for the specific Cisco IP phones:

Note The file names are case sensitive.

```
Router(config)# keyswitch
Router(config-keyswitch)# load 7960-7940 P003D302
Router(config-keyswitch)# load 7910 P004D302

Router(config)# tftp-server flash:P003D302.bin
Router(config)# tftp-server flash:P004D302.bin
```

Note The .bin suffix is not required by the **load** command; however, the .bin suffix is required by the **tftp-server** command.

The Cisco IP phone is updated with a different phone image only when the Cisco IP phone reboots.

Related Commands

Command	Description
ephone	Enters ephone configuration mode.
ephone-dn	Enters the ephone-dn configuration mode.
keyswitch	Enables IP Keyswitch support and enters keyswitch configuration mode.
tftp-server	Enables TFTP access to .cnf file on the TFTP server so that the Cisco IP phone can get the file.

mac-address (ephone)

To configure the MAC address of the Cisco IP phone, use the **mac-address** ephone configuration command. To disable the MAC address of the Cisco IP phone, use the **no** form of this command.

mac-address *mac-address*

no mac-address *mac-address*

Syntax Description

mac-address	Identifies a specific Cisco IP phone. The MAC address is typically found on a sticker located on the bottom of the Cisco IP phone.

Defaults

No default behavior or values.

Command Modes

Ephone configuration

Command History

Release	Modification
12.1(5)YD	This command was introduced on the Cisco 2600 series and Cisco 3600 series multiservice routers, and Cisco IAD2420 routers.

Usage Guidelines

The **mac-address** command configures the MAC address of a specific Cisco IP phone to uniquely identify the Cisco IP phone. The MAC address is printed on a sticker and placed under each Cisco IP phone.

Examples

The following example shows how to configure the actual MAC address CCFBA.321B.96FA for a Cisco IP phone:

```
Router(config-ephone)# mac-address CFBA.321B.96FA
```

Related Commands

Command	Description
ephone	Enters the ephone configuration mode.
ephone-dn	Enters the ephone-dn configuration mode.
keyswitch	Enables IP Keyswitch support and enters keyswitch configuration mode.
show ephone	Displays Cisco IP phone output.

max-dn (keyswitch)

To set the maximum number of directory numbers that can be supported by the router, use the **max-dn** keyswitch configuration command. To return to the default directory numbers, use the **no** form of this command.

max-dn *max directory numbers*

no max-dn

Syntax Description

max directory numbers	The maximum number of directory numbers supported by the router. The upper limit value is platform dependent: • Maximum 48 directory numbers for the Cisco 2600 series, Cisco 3620, and Cisco IAD2420 routers • Maximum 96 directory numbers for the Cisco 3640 and Cisco 3660 multiservice routers

Defaults

The default is 0.

The maximum number of directory numbers is platform dependent:

- Maximum 48 directory numbers for the Cisco 2600 series, Cisco 3620, and Cisco IAD2420 routers
- Maximum 96 directory numbers for the Cisco 3640 and Cisco 3660 multiservice routers

Syntax Description

Keyswitch configuration

Command History

Release	Modification
12.1(5)YD	This command was introduced on the Cisco 2600 series and Cisco 3600 series multiservice routers, and Cisco IAD2420 routers.

Usage Guidelines

The **max-dn** command limits the number of Cisco IP phone directory numbers available on the router.

Note You cannot reduce the limit of the directory numbers after the maximum allowable number is configured, without rebooting the router.

Examples

The following example shows how to set the maximum number of directory numbers to 12:

```
Router(config)# keyswitch
Router(config-keyswitch)# max-dn 12
```

Related Commands

Command	Description
ephone	Enters ephone configuration mode.
ephone-dn	Enters the ephone-dn configuration mode.
keyswitch	Enables IP Keyswitch support and enters keyswitch configuration mode.
max-ephones	Configures the maximum number of Cisco IP phones that can be supported by the router.

max-ephones (keyswitch)

To configure the maximum number of Cisco IP phones that can be supported by the router, use the **max-ephones** keyswitch configuration command. To return to the default number of Cisco IP phones, use the **no** form of this command.

max-ephones *max phones*

no max-ephones

Syntax Description

max phones	The maximum number of Cisco IP phones supported by the router. The upper limit value is platform dependent: • Maximum 24 Cisco IP phones for the Cisco 2600 series, Cisco 3620, and Cisco IAD2420 routers • Maximum 48 Cisco IP phones for the Cisco 3640 and Cisco 3660 multiservice routers

Defaults

The default is 0.

The maximum number of phones is platform dependent:

- Maximum 24 Cisco IP phones for the Cisco 2600 series, Cisco 3620, and Cisco IAD2420 routers
- Maximum 48 Cisco IP phones for the Cisco 3640 and Cisco 3660 multiservice routers

Syntax Description

Keyswitch configuration

Command History

Release	Modification
12.1(5)YD	This command was introduced on the Cisco 2600 series and Cisco 3600 series multiservice routers, and Cisco IAD2420 routers.

Usage Guidelines

The **max-ephones** command limits the number of Cisco IP phones supported on the router.

Note You cannot reduce the limit of the Cisco IP phones after the maximum allowable number is configured, without rebooting the router.

Examples

The following example shows how to set the maximum number of Cisco IP phones to 24 for a Cisco router:

```
Router(config)# keyswitch
Router(config-keyswitch)# max-ephones 24
```

Related Commands

Command	Description
ephone	Enters ephone configuration mode.
ephone-dn	Enters the ephone-dn configuration mode.
keyswitch	Enables IP Keyswitch support and enters keyswitch configuration mode.
max-dn	Sets the maximum number of directory numbers that can be supported by the router.

name (ephone-dn)

To configure a user name associated with a directory number, use the **name** ephone-dn configuration command. To disable a user name associated with a directory number, use the **no** form of this command.

name *name*

no name *name*

Syntax Description

name	Directory number user name.

Defaults

No default behavior or values.

Command Modes

Ephone-dn configuration

Command History

Release	Modification
12.1(5)YD	This command was introduced on the Cisco 2600 series and Cisco 3600 series multiservice routers, and Cisco IAD2420 routers.

Usage Guidelines

The *name* variable information is used to provide caller ID for calls originated on the Cisco IP phone directory number.

Examples

The following example shows how to configure the user name John Smith:

```
Router(config-ephone-dn)# name John Smith
```

Related Commands

Command	Description
ephone	Enters ephone configuration mode.
ephone-dn	Enters the ephone-dn configuration mode.
keyswitch	Enables IP Keyswitch support and enters keyswitch configuration mode.
number	Configures a valid number for the Cisco IP phone.

number (ephone-dn)

To configure a valid number for the Cisco IP phone, use the **number** ephone-dn configuration command. To disable a number for the Cisco IP phone, use the **no** form of this command.

number *number* [**secondary** *number*]

no number *number* [**secondary** *number*]

Syntax Description

number	E.164 telephone number.
secondary	(Optional) A second telephone number with an ephone-dn.

Defaults

No secondary phone number is associated with the ephone-dn.

Command Modes

Ephone-dn configuration

Command History

Release	Modification
12.1(5)YD	This command was introduced on the Cisco 2600 series and Cisco 3600 series multiservice routers, and Cisco IAD2420 routers.

Usage Guidelines

The **number** command configures a valid number for the Cisco IP phone. The **secondary** keyword allows you to associate a second telephone number with an ephone-dn so that the Cisco IP phone line can be called by dialing either the main or secondary phone number. The secondary number may contain wildcards; for example, ... (four decimal points).

Examples

The following example shows that 5001 is set as the primary extension number for a Cisco IP phone and 0 as the secondary number. This allows the telephone number 5001 to act as a regular extension number and also act as the operator line such that callers who dial 0 are routed to the phone line with extension number 5001.

```
Router(config-ephone-dn)# number 5001 secondary 0
```

In the second example, 5001 is set as the primary extension number for a Cisco IP phone and 500. (The number 500 is followed by a decimal point.) is set as the as the secondary number. This allows any calls to extension numbers in the range 5000-5009 to be routed to extension 5001 in the event that the actual extension number dialed cannot be found. For example, IP phones may be active in the system with lines that correspond to 5001, 5002, 5004, 5005, and 5009. A call to 5003 or 5006-5009 would be unable to locate a phone with the 5003 or 5006-5008 extensions, so the call would be routed to extension 5001.

```
Router(config-ephone-dn)# number 5001 secondary 500.
```

Related Commands

Command	Description
ephone	Enters ephone configuration mode.
ephone-dn	Enters the ephone-dn configuration mode.
huntstop	Sets the huntstop attribute for the dial-peers associated with the Cisco IP phone lines.
keyswitch	Enables IP Keyswitch support and enters keyswitch configuration mode.
name	Configures a user name associated with a directory number.
preference	Sets preference for the attached dial peer for a directory number.

preference (ephone-dn)

To set preference for the attached dial peer for a directory number, use the **preference** ephone-dn configuration command. To disable a number for the Cisco IP phone, use the **no** form of this command.

preference *preference order*

no preference *preference order*

Syntax Description

preference order	The preference order is 0 to 10.

Defaults

The default is 0.

Command Modes

Ephone-dn configuration

Command History

Release	Modification
12.1(5)YD	This command was introduced on the Cisco 2600 series and Cisco 3600 series multiservice routers, and Cisco IAD2420 routers.

Usage Guidelines

The **preference** command sets preference for the attached dial peer for a particular directory number.

Examples

The following example shows how to set a preference 2 for the directory number 3000:

```
Router(config-ephone-dn)# preference 2
Router(config-ephone-dn)# number 3000
```

Related Commands

Command	Description
ephone	Enters ephone configuration mode.
ephone-dn	Enters the ephone-dn configuration mode.
huntstop	Sets the huntstop attribute for the dial-peers associated with the Cisco IP phone lines.
keyswitch	Enables IP Keyswitch support and enters keyswitch configuration mode.
name	Configures a user name associated with a directory number.
number	Configures a valid number for the Cisco IP phone.

reset (ephone)

To reset the Cisco IP phones in the ephone configuration mode, use the **reset** ephone configuration command.

reset

Syntax Description

This command has no arguments or keywords.

Defaults

No default behavior or values.

Command Modes

Ephone configuration

Command History

Release	Modification
12.1(5)YD	This command was introduced on the Cisco 2600 series and Cisco 3600 series multiservice routers, and Cisco IAD2420 routers.

Usage Guidelines

The **reset** command does not have a **no** form of the command.

Examples

The following example shows how to reset the Cisco IP phones:

```
Router(config)# ephone 1
Router(config-ephone)# reset
```

Related Commands

Command	Description
ephone	Enters ephone configuration mode.
ephone-dn	Enters the ephone-dn configuration mode.
keyswitch	Enables IP Keyswitch support and enters keyswitch configuration mode.

reset (keyswitch)

To reset the Cisco IP phones in the keyswitch mode, use the **reset** keyswitch configuration command.

reset {**all** | **mac-address** *mac-address*}

Syntax Description

all	All the Cisco IP phones.
mac-address *mac-address*	MAC address of a particular Cisco IP phone.

Defaults

No default behavior or values.

Command Modes

Keyswitch configuration

Command History

Release	Modification
12.1(5)YD	This command was introduced on the Cisco 2600 series and Cisco 3600 series multiservice routers, and Cisco IAD2420 routers.

Usage Guidelines

The **reset** command does not have a **no** form.

Examples

The following example shows how to reset all the Cisco IP phones:

```
Router(config)# keyswitch
Router(config-keyswitch)# reset all
```

The following example shows how to configure the Cisco IP phone with the MAC address CFBA.321B.96FA:

```
Router(config)# keyswitch
Router(config-keyswitch)# reset mac-address CFBA.321B.96FA
```

Related Commands

Command	Description
ephone	Enters ephone configuration mode.
ephone-dn	Enters the ephone-dn configuration mode.
keyswitch	Enables IP Keyswitch support and enters keyswitch configuration mode.

show ephone

To display Cisco IP phone output, use the **show ephone** EXEC command.

show ephone [*mac-address*]

Syntax Description

mac-address	(Optional) Specifies the MAC address of the Cisco IP phone.

Command Modes

EXEC

Command History

Release	Modification
12.1(5)YD	This command was introduced on the Cisco 2600 series and Cisco 3600 series multiservice routers, and Cisco IAD2420 routers.

Usage Guidelines

The **show ephone** command displays the registered Cisco IP phones. If a MAC address is not specified, all phones are displayed.

Examples

The following is a sample output from the **show ephone** command:

```
Router# show ephone
ephone-1 Mac:0003.E3E7.F627 TCP socket:[1] activeLine:1 REGISTERED
mediaActive:1 offhook:1 ringing:0 reset:0 reset_sent:0 debug:0
IP:10.0.0.51 50570 Telecaster 7940  keepalive 49
button 1: dn 1  number 3001 CONNECTED
Active Call on DN 1:3001  10.0.0.51 31808 to  1.2.159.100 22708
Tx Pkts 452 bytes 41584 Rx Pkts 452 bytes 41584 Lost 0
Jitter 0 Latency 0

ephone-2 Mac:0030.94C3.E1A8 TCP socket:[2] activeLine:1 REGISTERED
mediaActive:1 offhook:1 ringing:0 reset:0 reset_sent:0 debug:0
IP:1.2.159.100 50942 Telecaster 7960  keepalive 78
button 1: dn 2  number 3002 CONNECTED
Active Call on DN 2:3002  1.2.159.100 22708 to  10.0.0.51 31808
Tx Pkts 452 bytes 41584 Rx Pkts 452 bytes 41584 Lost 0
Jitter 0 Latency 0

ephone-3 Mac:0030.94C3.F946 TCP socket:[-1] activeLine:0 UNREGISTERED
mediaActive:0 offhook:0 ringing:0 reset:0 reset_sent:0 debug:0
IP:10.2.1.2 52163 Telecaster 7960  keepalive 59

ephone-4 Mac:0030.94C3.F43A TCP socket:[-1] activeLine:0 UNREGISTERED
mediaActive:0 offhook:0 ringing:0 reset:0 reset_sent:0 debug:0
IP:10.2.1.1 51768 Telecaster 7960  keepalive 59
```

The following is a sample output from the **show ephone** command for the Cisco IP phone with the MAC address 0030.94C3.F43A:

```
Router# show ephone 0030.94c3.f43a

ephone-3 Mac:0030.94C3.F43A TCP socket:[3] activeLine:0 REGISTERED
mediaActive:0 offhook:0 ringing:0 reset:0 reset_sent:0 debug:0
IP:1.5.81.13 Telecaster 7960  keepalive 28
button 1: dn 3 number 5003 IDLE
button 2: dn 5 number 5005 IDLE
button 3: dn 6 number 5006 IDLE
speed dial 1:3005
speed dial 2:3006
```

Table 1 provides an alphabetical listing of the command fields in the sample output.

Table 1 show ephone Field Descriptions

Field	Description
Active Call	An active call is in progress.
activeLine	Indicates the line (button) on the phone that is in use. Zero indicates that no line is in use.
button 1 : dn 1	Shows the directory number (DN) tag number associated with the phone button.
bytes	Total number of voice data bytes sent or received by the Cisco IP phone.
debug	If set to 1, indicates debug for the phone is enabled; otherwise it is set to 0.
ephone-1	Cisco IP phone tag number.
IDLE	The state of the DN is IDLE.
IP	Assigned IP address of the Cisco IP phone.
Jitter	The amount of variation (in milliseconds) of the time interval between voice packets received by the Cisco IP phone.
keepalive	Number of keepalive messages received from the Cisco IP phone by the router.
Latency	The estimated playout delay for voice packets received by the Cisco IP phone.
Lost	Number of voice packets lost, as calculated by the Cisco IP phone, based on examining voice packet timestamp and sequence numbers during playout.
Mac	MAC address.
mediaActive	If set to 1, indicates that an active conversation is going on; otherwise, it is set to 0.
number	The telephone number associated with the Cisco IP phone button and its DN tag.
offhook	If set to 1, indicates that the Cisco IP phone is off the hook.

Table 1 show ephone Field Descriptions (continued)

Field	Description
REGISTERED	Indicates that the Cisco IP phone is active and registered. Alternatives states are UNREGISTERED (indicating that the connection to the Cisco IP phone was closed in a normal manner) and DECEASED (indicating that the connection to the Cisco IP phone was closed because of a keepalive timeout).
reset	Pending reset.
reset_sent	Request for reset sent to the Cisco IP phone.
ringing	If set to 1, indicates that the IP phone's ringer is turned on and the phone is ringing; otherwise, it is set to 0.
Rx Pkts	Number of received voice packets.
speed dial	Speed dial is set to a specific directory number.
TCP socket	Indicates the TCP socket number used to communicate with the IP phone. This can be correlated with the output of various other **debug** and **show** commands.
Telecaster *model number*	Indicates the type and model of the Cisco IP phone. This information is received from the phone during its registration with the router.
Tx Pkts	Number of transmitted voice packets.

Related Commands

Command	Description
show ephone-dn	Displays the Cisco IP phone destination number.
show ephone-dn summary	Displays summary of the Cisco IP phone destination numbers.
show keyswitch	Displays the detailed configuration of all the Cisco IP phones.

show ephone-dn

To display a Cisco IP phone destination number of the IP Keyswitch router, use the **show ephone-dn** EXEC command.

show ephone-dn [*tag* | **summary**]

Syntax Description

tag	(Optional) Destination number tag. The destination number can be from 1 to 24.
summary	Summary of all Cisco IP phone destination number.

Command Modes

EXEC

Command History

Release	Modification
12.1(5)YD	This command was introduced on the Cisco 2600 series and Cisco 3600 series multiservice routers, and Cisco IAD2420 routers.

Examples

The following is sample output from the **show ephone-dn** command:

```
Router# show ephone-dn 1
EFXS 50/0/1 Slot is 50, Sub-unit is 0, Port is 1
 Type of VoicePort is EFXS
 Operation State is UP
 Administrative State is UP
 No Interface Down Failure
 Description is not set
 Noise Regeneration is enabled
 Non Linear Processing is enabled
 Music On Hold Threshold is Set to -38 dBm
 In Gain is Set to 0 dB
 Out Attenuation is Set to 0 dB
 Echo Cancellation is enabled
 Echo Cancel Coverage is set to 8 ms
 Playout-delay Mode is set to default
 Playout-delay Nominal is set to 60 ms
 Playout-delay Maximum is set to 200 ms
 Connection Mode is normal
 Connection Number is not set
 Initial Time Out is set to 10 s
 Interdigit Time Out is set to 10 s
 Ringing Time Out is set to 180 s
 Companding Type is u-law
 Region Tone is set for US
 Wait Release Time Out is 30 s
 Station name None, Station number 5001

 Caller ID Info Follows:
 Standard BELLCORE

 Voice card specific Info Follows:
 Digit Duration Timing is set to 100 ms
```

The following is sample output from the **show ephone-dn summary** command:

```
Router# show ephone-dn summary
PORT     DN STATE    CODEC    VAD VTSP STATE            VPM STATE
======== ========== ======== === ==================== =========
50/0/1   DOWN        -         -  -                    EFXS_ONHOOK

50/0/2   DOWN        -         -  -                    EFXS_ONHOOK

50/0/3   DOWN        -         -  -                    EFXS_ONHOOK

50/0/4   DOWN        -         -  -                    EFXS_ONHOOK
```

Table 2 provides an alphabetical listing of the command fields in the sample output.

Table 2 show ephone-dn Field Descriptions

Field	Description
Administrative State	Administrative (configured) state of the voice port.
Caller ID Info	Information about the caller ID.
CODEC	Codec type.
Companding Type	Not applicable to the Cisco IP phone.
Connection Mode	Not applicable to the Cisco IP phone.
Connection Number	Not applicable to the Cisco IP phone.
Description	Not applicable to the Cisco IP phone.
DN STATE	State of the Cisco IP phone line associated with a directory number (DN).
Echo Cancellation	Not applicable to the Cisco IP phone.
Echo Cancel Coverage	Not applicable to the Cisco IP phone.
EFXS	The voice port type.
In Gain	Not applicable to the Cisco IP phone.
Initial Time Out	Amount of time the system waits for an initial input digit from the caller.
Interdigit Time Out	Amount of time the system waits for a subsequent input digit from the caller.
Music-On-Hold Threshold	Not applicable to the Cisco IP phone.
No Interface Down Failure	State of the interface.
Noise Regeneration	Not applicable to the Cisco IP phone.
Non-Linear Processing	Not applicable to the Cisco IP phone.
Operational State	Operational state of the voice port.
Out Attenuation	Not applicable to the Cisco IP phone.
Playout-delay Maximum	Not applicable to the Cisco IP phone.
Playout-delay Mode	Not applicable to the Cisco IP phone.
Playout-delay Nominal	Not applicable to the Cisco IP phone.

Table 2 show ephone-dn Field Descriptions (continued)

Field	Description
Port	Port number for this interface associated with the voice interface card.
Region Tone	Not applicable to the Cisco IP phone.
Ringing Time Out	Ringing time out duration.
Station name	Station name.
Station number	Station number.
Slot	Slot used in the voice interface card for this port.
Sub-unit	Subunit used in the voice interface card for this port.
Type of VoicePort	Indicates the voice port type.
VAD	Voice activity detection.
Voice card specific Info	Information specific to the voice card.
VPM STATE	State indication for the VPM software component.
VTSP STATE	State indication for the VTSP software component.
Wait Release Time Out	The time that a voice port stays in the call-failure state while the router sends a busy tone, reorder tone, or an out-of-service tone to the port.

Related Commands

Command	Description
show ephone	Displays Cisco IP phone output.

show ephone summary

To display Cisco IP phone output summary, use the **show ephone summary** EXEC command.

show ephone summary

Syntax Description

This command has no arguments or keywords.

Command Modes

EXEC

Command History

Release	Modification
12.1(5)YD	This command was introduced on the Cisco 2600 series and Cisco 3600 series multiservice routers, and Cisco IAD2420 routers.

Usage Guidelines

The **show ephone summary** command is similar to the **show ephone** command. However, the **show ephone summary** command does not display the destination numbers listed. If you do not specify a MAC address, you get the status information about all the Cisco IP phones.

Examples

The following is a sample output from the s**how ephone summary** command:

```
Router# show ephone summary

ephone-1 Mac:0030.94C3.37CB TCP socket:[-1] activeLine:0 REGISTERED
mediaActive:0 offhook:0 ringing:0 reset:0 reset_sent:0 debug:0
IP:10.1.1.1 Telecaster 7910  keepalive 45  1:1
sp1:5002 sp2:5003

ephone-2 Mac:0030.94C3.F96A TCP socket:[-1] activeLine:0 REGISTERED
mediaActive:0 offhook:0 ringing:0 reset:0 reset_sent:0 debug:0
IP:10.1.1.2 Telecaster 7960  keepalive 45  1:2 2:3 3:4
sp1:5004 sp2:5001

ephone-3 Mac:0030.94C3.F946 TCP socket:[-1] activeLine:0 REGISTERED
mediaActive:0 offhook:0 ringing:0 reset:0 reset_sent:0 debug:0
IP:10.2.1.2 Telecaster 7960  keepalive 59


ephone-4 Mac:0030.94C3.F43A TCP socket:[-1] activeLine:0 REGISTERED
mediaActive:0 offhook:0 ringing:0 reset:0 reset_sent:0 debug:0
IP:10.2.1.1 Telecaster 7960  keepalive 59
```

Table 3 provides an alphabetical listing of the command fields in the sample output.

Table 3 show ephone summary Field Descriptions

Field	Description
activeLine	Indicates the line (button) on the phone that is in use. Zero indicates that no line is in use
debug	If set to 1, indicates debug for the phone is enabled; otherwise, it is set to 0.
ephone-1	Cisco IP phone tag number.
IP	Assigned IP address of the Cisco IP phone.
keepalive	Number of keepalive received from the IP phone by the router.
Mac	MAC address.
mediaActive	If set to 1, indicates that an active conversation is going on; otherwise, it is set to 0.
offhook	If set to 1, indicates that the phone is off the hook.
REGISTERED	Indicates that the Phone is active and registered. Alternatives states are UNREGISTERED (indicating that the connection to the Cisco IP phone was closed in a normal manner) and DECEASED (indicating that the connection to the Cisco IP phone was closed because of a keepalive timeout).
reset	Pending reset.
reset_sent	Request for reset sent to the Cisco IP phone.
ringing	If set to 1, indicates that the Cisco IP phone's ringer is turned on and the phone is ringing; otherwise, it is set to 0.
sp1	Speed dial 1 set to a directory number.
sp2	Speed dial 2 set to a directory number.
TCP socket	Indicates the TCP socket number used to communicate with the Cisco IP phone. This can be correlated with the output of various other **debug** and **show** commands.
Telecaster *model number*	Indicates the type and model of the IP phone. This information is received from the phone during its registration with the router.

Related Commands

Command	Description
show ephone	Displays Cisco IP phone output.

show keyswitch all

To display the detailed configuration of all the Cisco IP phones, voice ports, and dial peers of the IP Keyswitch router, use the **show keyswitch all** EXEC command.

show keyswitch all

Syntax Description

This command has no arguments or keywords.

Command Modes

EXEC

Command History

Release	Modification
12.1(5)YD	This command was introduced on the Cisco 2600 series and Cisco 3600 series multiservice routers, and Cisco IAD2420 routers.

Examples

The following is sample output from the **show keyswitch all** command:

```
Router# show keyswitch all
CONFIG
======
ip source-address 10.0.0.1 port 2000
max-ephones 24
max-dn 24
dialplan-pattern 1 408734....
voicemail 11111
transfer-pattern 510734....
keepalive 30


ephone-dn 1
number 5001
huntstop

ephone-dn 2
number 5002
huntstop
call-forward noan 5001 timeout 8

ephone-dn 3
number 5003
huntstop


ephone 1
mac-address 0030.94C3.37CB
type 0
button  1:1
speed-dial 1 5002
speed-dial 2 5003
cos 0
!
ephone 2
mac-address 0030.94C3.F96A
```

```
type 0
button  1:2 2:3 3:4
speed-dial 1 5004
speed-dial 2 5001
cos 0
!


voice-port 50/0/1
 station-id number 5001
!
voice-port 50/0/2
 station-id number 5002
 timeout ringing 8
!

dial-peer voice 20025 pots
 destination-pattern 5001
 huntstop
 port 50/0/1

dial-peer voice 20026 pots
 destination-pattern 5002
 huntstop
 call-forward noan 5001
 port 50/0/2

dial-peer voice 20027 pots
 destination-pattern 5003
 huntstop
 port 50/0/3
```

Table 4 provides an alphabetical listing of the command fields in the sample output.

Table 4 show keyswitch all Field Descriptions

Field	Description
button	Button on the Cisco IP phone.
call-forward noan	Call forward no answer is set.
cos	Not applicable/unused.
destination-pattern	Destination pattern (telephone number) configured for this dial peer.
dial-peer voice	Voice dial peer.
dialplan-pattern	Dial-plan pattern is set to expand the abbreviated extension numbers to fully qualified E.164 numbers.
ephone	Cisco IP phone.
ephone-dn	Cisco IP phone directory number.
huntstop	Huntstop is set.
ip source address	IP address used by the IP phones to register with the router for service.
keepalive	The IP phone keepalive period in seconds.
mac-address	MAC address.

Table 4 show keyswitch all Field Descriptions (continued)

Field	Description
max-ephones	Maximum Cisco IP phones.
max-dn	Maximum directory numbers.
number	Cisco IP phone number.
port	The TCP port number used by the IP phones to communicate with the router.
pots	POTS dial peer set.
station-id number	The number used for caller ID purposes when calls are made using the line.
speed-dial	Speed dial is set.
timeout	Timeout is set.
timeout ringing	The maximum amount of time that the phone is allowed to ring before the call is disconnected.
transfer-pattern	Transfer pattern is set to allow transfer of calls to a specified number.
type	Not applicable/unused.
voicemail	A voice-mail (speed-dial) number is set.
voice-port	(Virtual) voice port designator.

Related Commands

Command	Description
show keyswitch dial-peer	Displays IP Keyswitch output for the dial peers of the IP Keyswitch router.
show keyswitch voice-port	Displays the virtual voice port configuration of the IP Keyswitch router.

show keyswitch dial-peer

To display IP Keyswitch configuration for the Cisco IP phone dial peers of the IP Keyswitch router, use the **show keyswitch dial-peer** EXEC command.

show keyswitch dial-peer

Syntax Description

This command has no arguments or keywords.

Command Modes

EXEC

Command History

Release	Modification
12.1(5)YD	This command was introduced on the Cisco 2600 series and Cisco 3600 series multiservice routers, and Cisco IAD2420 routers.

Usage Guidelines

The dial peers cannot be edited manually. You can change the dial peers by entering the **ephone-dn** command.

Examples

The following is sample output from the **show keyswitch dial-peer** command:

```
Router# show keyswitch dial-peer
dial-peer voice 20025 pots
 destination-pattern 5001
 huntstop
 port 50/0/1

dial-peer voice 20026 pots
 destination-pattern 5002
 huntstop
 call-forward noan 5001
 port 50/0/2

dial-peer voice 20027 pots
 destination-pattern 5003
 huntstop
 port 50/0/3

dial-peer voice 20028 pots
 destination-pattern 5004
 huntstop
 port 50/0/4
```

Table 5 provides an alphabetical listing of the command fields in the sample output.

Table 5 show keyswitch dial-peer Field Descriptions

Field	Description
destination pattern	Destination pattern (telephone number) configured for this dial peer.
dial-peer voice	Voice dial peer.
huntstop	Huntstop is set.
port	(Virtual) voice port designator.
pots	POTS dial peer set.

Related Commands

Command	Description
ephone	Enters ephone configuration mode.
ephone-dn	Enters the ephone-dn configuration mode.
show keyswitch all	Displays the detailed configuration of all the Cisco IP phones.
show keyswitch ephone-dn	Displays Cisco IP phone destination number output of the IP Keyswitch router.
show keyswitch voice-port	Displays the virtual voice-port configuration of the IP Keyswitch router.

show keyswitch ephone

To display IP Keyswitch configuration for the Cisco IP phones, use the **show keyswitch ephone** EXEC command.

show keyswitch ephone

Syntax Description

This command has no arguments or keywords.

Command Modes

EXEC

Command History

Release	Modification
12.1(5)YD	This command was introduced on the Cisco 2600 series and Cisco 3600 series multiservice routers, and Cisco IAD2420 routers.

Examples

The following is sample output from the **show keyswitch ephone** command:

```
Router# show keyswitch ephone

ephone 1
mac-address 0030.94C3.37CB
type 0
button  1:1
speed-dial 1 5002
speed-dial 2 5003
cos 0
!
ephone 2
mac-address 0030.94C3.F96A
type 0
button  1:2 2:3 3:4
speed-dial 1 5004
speed-dial 2 5001
cos 0
!
```

Table 6 provides an alphabetical listing of the command fields in the sample output.

Table 6 show keyswitch ephone Field Descriptions

Field	Description
button	Button on the Cisco IP phone.
cos	Not applicable/unused.
ephone	Cisco IP phone.
mac-address	MAC address of the Cisco IP phone.
type	Not applicable/unused.
speed-dial	Speed-dial set.

Related Commands

Command	Description
show keyswitch all	Displays the detailed configuration of all the Cisco IP phones.
show keyswitch dial-peer	Displays IP Keyswitch output for the dial peers of the IP Keyswitch router.
show keyswitch ephone-dn	Displays Cisco IP phone destination number output of the IP Keyswitch router.
show keyswitch voice-port	Displays the virtual voice-port configuration of the IP Keyswitch router.

show keyswitch ephone-dn

To display Cisco IP phone destination number output of the IP Keyswitch router, use the **show keyswitch ephone-dn** EXEC command.

show keyswitch ephone-dn

Syntax Description

This command has no arguments or keywords.

Command Modes

EXEC

Command History

Release	Modification
12.1(5)YD	This command was introduced on the Cisco 2600 series and Cisco 3600 series multiservice routers, and Cisco IAD2420 routers.

Examples

The following is sample output from the **show keyswitch ephone-dn** command:

```
Router# show keyswitch ephone-dn

ephone-dn 1
number 5001
huntstop

ephone-dn 2
number 5002
huntstop
call-forward noan 5001 timeout 8

ephone-dn 3
number 5003
huntstop

ephone-dn 4
number 5004
huntstop
```

Table 7 provides an alphabetical listing of the command fields in the sample output.

Table 7 show keyswitch ephone-dn Field Descriptions

Field	Description
call-forward noan	Call forward set to no answer. Other available options are call-forward busy and call-forward all.
ephone-dn	Cisco IP phone directory number.
huntstop	Huntstop is set.
number	Cisco IP phone number.
timeout	Timeout setting for call forwarding during no answer.

Related Commands

Command	Description
show keyswitch all	Displays the detailed configuration of all the Cisco IP phones.
show keyswitch dial-peer	Displays IP Keyswitch output for the dial peers of the IP Keyswitch router.
show keyswitch voice-port	Displays the virtual voice-port configuration of the IP Keyswitch router.

show keyswitch voice-port

To display virtual voice-port configuration of the IP Keyswitch router, use the **show keyswitch voice-port** EXEC command.

show keyswitch voice-port

Syntax Description

This command has no arguments or keywords.

Command Modes

EXEC

Command History

Release	Modification
12.1(5)YD	This command was introduced on the Cisco 2600 series and Cisco 3600 series multiservice routers, and Cisco IAD2420 routers.

Usage Guidelines

Displays virtual voice port configuration of the IP Keyswitch router. Each Cisco IP phone corresponds to a virtual voice port. For example, Cisco IP phone directory number 7 corresponds to virtual voice port 50/0/7. The virtual voice-port provides the telephone line associated with the Cisco IP phone directory number (ephone-dn).

Examples

The following example is sample output from the **show keyswitch voice-port** command:

```
Router# show keyswitch voice-port

voice-port 50/0/1
 station-id number 5001
!
voice-port 50/0/2
 station-id number 5002
 timeout ringing 8
!
voice-port 50/0/3
 station-id number 5003
!
voice-port 50/0/4
 station-id number 5004
!
```

Table 8 provides an alphabetical listing of the command fields in the sample output.

Table 8 show keyswitch voice-port Field Descriptions

Field	Description
station-id number	The phone number used for caller ID purposes for calls made from this voice port.
timeout ringing	The maximum amount of time that the phone is allowed to ring before the call is disconnected.
voice-port	(Virtual) voice port.

Related Commands

Command	Description
show keyswitch all	Displays the detailed configuration of all the Cisco IP phones.
show keyswitch dial-peer	Displays IP Keyswitch output for the dial peers of the IP Keyswitch router.
show keyswitch ephone-dn	Displays Cisco IP phone destination number output of the IP Keyswitch router.

speed-dial (ephone)

To set speed-dial buttons on a Cisco IP phone, use the **speed-dial** ephone configuration command. To disable speed-dial buttons on a Cisco IP phone, use the **no** form of this command.

speed-dial *button-number directory-number*

no speed-dial *button-number directory-number*

Syntax Description

button-number	Speed-dial string tag for the Cisco IP phone speed-dial button number. The button number ranges from 1 to 4.
directory-number	Directory number on a phone.

Defaults

No default behavior or values.

Command Modes

Ephone configuration

Command History

Release	Modification
12.1(5)YD	This command was introduced on the Cisco 2600 series and Cisco 3600 series multiservice routers, and Cisco IAD2420 routers.

Usage Guidelines

The **speed-dial** command sets speed-dial buttons on a Cisco IP phone.

Note If more speed-dial buttons are defined than are actually supported by the physical phone, then the extra speed-dial configurations are ignored.

Examples

The following example shows how to set the speed-dial button 1 for the directory number 5001:

```
Router(config-ephone)# speed-dial 1 5001
```

Related Commands

Command	Description
ephone	Enters ephone configuration mode.

transfer-pattern (keyswitch)

To allow transfer of telephone calls by Cisco IP phones to other phone numbers, use the **transfer-pattern** keyswitch configuration command. To disable transfer of calls to other numbers, use the **no** form of this command.

transfer-pattern *transfer-pattern*

no transfer-pattern

Syntax Description

transfer-pattern	Digit string for permitted call transfers.

Defaults

Cisco IP phone to Cisco IP phone transfer only.

Command Modes

Keyswitch configuration

Command History

Release	Modification
12.1(5)YD	This command was introduced on the Cisco 2600 series and Cisco 3600 series multiservice routers, and Cisco IAD2420 routers.

Usage Guidelines

The **transfer-pattern** command allows you to transfer the call to non-IP phone numbers. The call is established between the other calling party and the new recipient. By default, all IP phone directory numbers are allowed as transfer targets.

Examples

The following example shows how to set the transfer pattern:

```
Router(config)# keyswitch
Router(config-keyswitch)# transfer-pattern 52540..
```

A maximum of 32 transfer patterns can be entered. In the previous example, 52540.. (The two decimal points are used here as wild cards.) permits transfers to any numbers in the range 525-4000 to 525-4099.

Related Commands

Command	Description
ephone	Enters ephone configuration mode.
ephone-dn	Enters the ephone-dn configuration mode.
keyswitch	Enables IP Keyswitch support and enters keyswitch configuration mode.

voicemail (keyswitch)

To configure the telephone number that is speed-dialed when the message button on a Cisco IP phone is pressed, use the **voicemail** keyswitch configuration command. To disable the messages button, use the **no** form of this command.

voicemail *phone-number*

no voicemail

Syntax Description

phone-number	The phone number that is configured as a speed-dial number to retrieve messages.

Defaults

No phone number is configured and the messages button is ineffective.

Command Modes

Keyswitch configuration

Command History

Release	Modification
12.1(5)YD	This command was introduced.

Usage Guidelines

The **voicemail** command configures the telephone number that is speed-dialed when the message button on a Cisco IP phone is pressed. The same voicemail telephone number is configured for all Cisco IP phones connected to the router.

The default behavior is that no phone number is configured and the messages button is ineffective.

Examples

The following example shows that the phone number 4085551000 is set as the speed-dial number that is dialed to retrieve messages when the messages button is pressed:

```
Router(config)# keyswitch
Router(config-keyswitch)# voicemail 914085551000
```

The number 914085551000 is called when the Cisco IP phone messages button is pressed to retrieve messages.

Related Commands

Command	Description
keyswitch	Enables IP Keyswitch support and enters keyswitch configuration mode.